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New Fields for Ploughing

When the war finished, there was a rush of technicians to Germany to familiarize themselves with any developments that had taken place since the outbreak of hostilities. Doubtlessly, the foundry industry gained something, but not a great deal. Then this last two years or so there has been a series of visits by parties of foundrymen to America to investigate the possibilities of increasing the productivity of British foundries. Here we believe much good will ultimately result. Finally, last year, a party of London foundrymen made a tour of inspection of the foundries in the French Ardennes, which also produced much valuable data.

We are reasonably familiar with French foundry industry, and we put forward the suggestion that there is much to learn from this country. The problems are akin to our own; for instance, French founders are cognisant of the impact of inflation on the conduct of business. For many years, their industry has employed much foreign labour. Here, similar conditions are gradually coming into being, as the labour shortage makes itself more and more felt. The French in their production schemes seem to make use of circular tables to great advantage. We have also gained the impression that French foundries conserve the skill of the craftsmen to better advantage than we do. Where mechanization has been undertaken, we think their production per man/hour is greater than ours, though comparisons are difficult as no two foundries make exactly the same type of casting. Published figures covering the whole industry show much the same production as in Great Britain, but we doubt if France possesses as high a percentage of mechanized plants. The French foundry owner is just as perplexed as his English confrère as to how he can carry out modernization. What we have said about France probably applies to Belgium also.

As these countries are so very easy to visit and not out of the way expensive, we suggest that just as soon as the Anglo-American reports have been thoroughly digested, arrangements should be made, preferably by grouped interests, for reciprocal visits of founders. The language difficulties need not be taken too seriously, as the number of bi-lingual foundrymen on both sides of the Channel is easily sufficient to overcome them. Works visits as undertaken during conferences are insufficient for the purpose of real study and it is only by working on the lines of the Anglo-American productivity teams that worthwhile information can be assembled and made available. Even if official team visits cannot be fixed-up, individual foundries can make reciprocal arrangements for plant inspection. Especially, we counsel the organization of teams by the ironfounding industry, as steel founders are already in close touch with Continental producers. As we have inspected but few non-ferrous foundries abroad, we are less able to express a worthwhile opinion on this section, but the chances are that at the very least there are numerous *tours de main* which could be picked up by brass-foundry visitors on either side of the Channel.

B

Sheet Steel *v.* Iron Castings

The following is the text of a letter over the signature of Mr. N. P. Newman, chairman, Council of Ironfoundry Associations, which appeared in Wednesday's Financial Times. *It replies in particular to correspondence previously published in that paper about the possibilities of substitution of sheet for castings and in general about the allegations that our industry last year received more than the budgeted amount of pig-iron and scrap.*

"Your correspondent states that the output of ironfoundries during 1951 was 250,000 tons more than was planned. We know of no such plan and, if the Ministry of Supply has such a plan, it is reasonable to assume that they would have told us of it. It is true that our output for 1950 was approximately 3½ million tons, but we had no reason to assume that it would be the same in 1951.

"The writer complains that there is no proper control over the industry, otherwise we should not have been allowed to use an extra 90,000 tons of pig-iron and 137,000 tons more of scrap. The Ministry of Supply exercises a control through the issue of licences, a system which is well suited to our industry, containing as it does a very large number of units engaged in a highly diverse production. There are more than 2,000 ironfoundries, some large and many small, whose supply of raw materials, equally diverse, could not be regulated by a form of rigid control.

"A control of the raw material stock position in the industry is maintained by the Ministry. During 1951, ironfounders' stocks of pig-iron were reduced by no less than 180,000 tons compared with a reduction of 12,000 tons in 1950. Thus most of our extra output last year consisted really in consuming our own stocks.

"It is suggested that because we had helped ourselves to the amount of pig-iron and scrap stated above, the steel industry had fallen short of their target of 16 million tons. During the year 1951 imports of scrap fell by no less than 1,340,000 tons, and it is only reasonable to assume that as the steelmaker is far more dependent on imported scrap than the ironfounder, it was this decline which was mainly responsible for the steel industry's failure.

"The extra amount of pig-iron and scrap (including our own stocks) used by ironfounders in 1951 comes to a total of 227,000 tons, which is less than one-sixth of the reduction in imported scrap. The truth is that the steel industry had 'scraped the barrel' in 1950 as they know now only too well.

"With regard to the suggestion made for the substitution of sheet steel in place of iron castings for the manufacture of certain domestic appliances: even supposing this were a right thing to do (and the manufacturers of appliances, pipes and baths will doubtless have much to say on this), it is a policy quite incapable of alleviating the present position. The disruption to the manufacturing industries concerned if such a policy were urgently pursued would be incalculable, not to mention the inevitable serious repercussions on the armament programme."

ABOUT 170 FIRMS will exhibit at the third Mechanical Handling Exhibition and Convention at Olympia, London, from June 4 to 14.

THE THIRD CONGRESS of the European Ceramic Association will be held in Paris from May 12 to 17, 1952. The local arrangements are being made by the Confederation des Industries Ceramiques de France. Further particulars may be obtained from Dr. A. T. Green, British Ceramic Research Association, Queens Road, Penkhull, Stoke-on-Trent.

Institute of Metals

Students' Essay Competition

The Institute of Metals will present, annually, two prizes of twenty guineas each for the best essays submitted in accordance with the regulations set out below. Each prize will be in the form of ten guineas in money and ten guineas in scientific, technical or other appropriate books, to be selected by the prizewinner. If of sufficient merit, a prize-winning essay may be published in the Institute's "Bulletin" or selected for reading before a local section.

Regulations

Eligibility.—The competition is open to all student members of the Institute, and to all associate members of local sections who are eligible for student membership of the Institute provided that both are within the normal age limits for student membership, viz., 17 to 25 yrs. A prizewinner will be ineligible to compete in the competition in the year subsequent to that in which he or she submitted a winning essay.

Language.—Essays must be submitted in English.

Length.—Essays should be 2,500 to 3,500 words long and typewritten with double-line spacing.

Subject.—For the 1952 competition, candidates may select a subject which comes under one or other of the following two headings. One prize will be given under each subject:—(*i*) non-ferrous foundry practice; (*ii*) metallography in industry. The subject matter should be logically presented, in good English, and should have a metallurgical content adequate to impress the adjudicators by its soundness, the exercise of critical faculty, and originality of approach. In each subject no prize will be awarded if the essays do not, in the opinion of the adjudicators, reach the requisite standard.

Method of Submission.—Each entry must be submitted to the Secretary, Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, not later than Monday, May 19, 1952, and must be accompanied by a certificate, signed by the entrant that the essay itself is entirely his or her own work, that it has not, in the form in which it is sent, been submitted for any other competition, and clearly stating what (if any) drawings, photographs, etc., have been prepared on his or her behalf.

On the Air

Item Broadcast on the B.B.C. 8 a.m. News, January 25.—The British Iron and Steel Federation says that too much of the output of the blast furnaces is being used as cast iron instead of for making steel and that, in view of the importance of expanding steel production, it would be reasonable to limit ironfoundry output to the 1950 level until steel output has been restored to at least 16½ million tons. If steel production is to reach 16 million tons this year, the statement continued, the output of pig-iron must be increased by one million tons, and the rising capacity of the blast furnaces makes this possible.

Statement by the Council of Ironfoundry Associations, Broadcast by the B.B.C. on January 26.—The Council of Ironfoundry Associations points out that, in 1951, ironfounders reduced their stocks of pig-iron by 180,000 tons to meet the Ministry of Supply's requirements and are now working on a hand-to-mouth basis. It was largely with metal resulting from this depletion of stocks that they were able last year to make a small increase in their output. They deny the right of another industry —*i.e.*, represented by the British Iron and Steel Federation—to define, or attempt to define, the rate of their expansion, and therefore to interfere with the ironfounders' responsibilities to the nation.

More Views on Recruitment

Recruitment of craftsmen apprentices looms large in the problems which beset foundrymen to-day, and, naturally the subject has been well ventilated at many meetings. It is clear that some executives have a flair for attracting and keeping apprentices, and raising them to a high standard of proficiency. Two men of this calibre, Mr. H. Haynes, past-president of the Lancashire branch of the Institute of British Foundrymen, and Mr. A. Talbot of the London branch, were invited to address meetings with a view to inculcating their methods for general adoption, and reports of these meetings follow below. Recruitment is essentially a matter of salesmanship, and the success achieved by Mr. Haynes and Mr. Talbot is obviously a function of their personalities, rather than due to any novel methods.

TRAINING FOUNDRY APPRENTICES*

By H. Haynes

The modern foundry has been improved greatly by new ideas and up-to-date equipment, yet when parents are deciding to send their boys into industry they generally enquire about various trades and if foundrywork is mentioned someone is sure to say, "Don't let him go into the foundry, because it is dirty and not healthy." Nevertheless, foundrywork is one of the healthiest of trades; for instance the average life of the foundryman is at the top of the listed trades. The Author maintains that it is not as dirty as many people think; what dirt there is may be brushed-off easily and washes-off, and there is little or no oil or grease, which are found in other branches of the engineering trade. Moreover, there are but few septic cases in the foundry.

What is needed in foundries is an intake of boys who will interest themselves in the work they are doing, and act on their own initiative; boys who are able to arrive at a reasonable decision when any difficulty presents itself, and who have power to apply their own ideas and not depend on others pulling them through. It is not suggested that the better-educated boys always make the better workmen. It can be said, however, that if they will give thought to what they are doing, it will go a long way to the making of successful craftsmen.

The reason for this attitude towards training is that there is no "rule of three" in a foundry, because each foundry has different methods, also moulders have different ways of producing castings. The boy, however, that is not dependent on others, and is able to reason out for himself the various problems which occur in the ordinary course of his work, is the boy worth training.

Early Beginning

On entering the foundry at the National Gas and Oil Engine Company, the age of a boy is 15 or above. The boy is placed in the care of a craftsman, not to run errands for the foundry but stay with this man for about three months; then if he seems interested in the work and shows promise, he is given the opportunity to try his hand on a different class of work. He may start on small green-sand jobbing and then be moved on to medium-size work, where he can make both green-sand and dry-sand work. At the age of 17 he is expected to show promise, so that he can prepare himself for the making of very large castings. In fact, there are at the foundry a large number of young men who have graduated from small work to making very large castings up to 25 tons. All this has been done by the guidance and supervision of a good experienced craftsman.

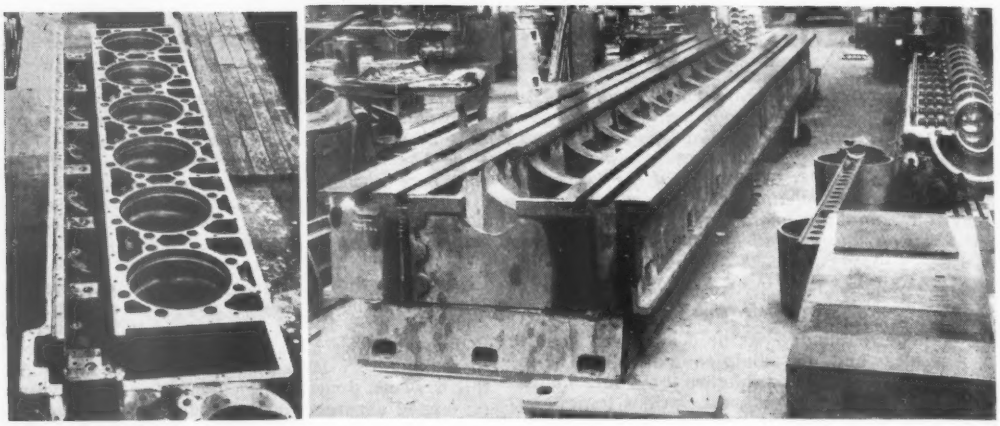
Effect of Military Training

Boys are encouraged, but not compelled, to implement their practical experience of the foundry with a theoretical and technical knowledge of their craft, by attendance at evening schools during the winter months, and also by means of an apprentices' day-course on foundrywork, etc. Of course, National Service interrupts their apprenticeship, but the Author suggests that boys do their foundry training before going into the services, as he believes this is better both for the boys and the Country. In fact, from personal experience, it seems the National Servicemen are the better craftsmen when they return from their period with the Forces. It is very hard to get them into the stride of foundrywork when they have been in the foundry only a year or two before joining the Services. On coming back they seem to have forgotten much of what they learned, and also what constitutes a fair day's work for a fair day's pay. There are, of course, some exceptions to this.

An apprentice is trained to be a technician, to understand the elements of patternmaking, also a little of design work, so that he can appreciate the best way to make cores and to vent them properly, also in fashioning core-grids so as to stop castings from cracking etc. On the metal side, the boys are trained to understand the various metals for the jobs they are making, also the runners needed to suit these, which matters are of great importance in the obtaining of successful castings. All apprentices are allowed and indeed encouraged to go all round the foundry, to be interested in all things which help to make castings. The boys must acquire knowledge of mixtures of sands—green-sand, dry-sand, loam, core-shop sands, etc.; in fact if they do not learn the fundamentals, trouble will later be experienced.

The firm encourages works visits from boys during their last term at school, also from technical schools and apprentices from other foundries. The works run an organized apprentices' social and recreational club, controlled by a committee of the boys themselves, with elected representatives

* Address given to the Bristol and West of England branch of the Institute of British Foundrymen.



FIGS. 1 AND 2.—*Large Cylinder-block Casting and Lathe Bed in the Machine-shop at National Gas and Oil Engine Works. These are the Sort of Castings which Apprentices ultimately help to make.*

from each department. In these and many other ways, the management has endeavoured to give the boys a fair deal, and to reward the boys' interest and enterprise by increased opportunity. Even the best system of apprentice training is never so perfect that it could not be improved upon. The results of any system depend to a very large extent upon the boys themselves, and also the element of human nature has to be considered. Very often, the boy's personal temperament will either make or mar his chance of success, and here the Author would impress on all who have to guide boys the importance of personal contact. A word of encouragement from a manager or foreman at the right time will completely alter a boy's outlook and will be remembered always, as also will a condemnation administered sharply. By this, it should be stressed that no boy should be allowed to make bad or indifferent work and not be called to account for it. Yet it is worth stressing that a boy who is conscientious and has made a mistake, will probably make a great many more—probably because of over-anxiety—if he is not handled correctly. If, however, the reason for his failure can be tactfully made clear to him, there is far more hope of making him into a successful craftsman than any bullying will ever do.

Psychology

This is the elementary psychology of the foundry and it is claimed that a policy of suggestion or persuasion will produce good and lasting results. These then are the elements of the Author's method of apprentice training and he can, it is believed, claim a fair measure of success. The scrap at his foundry is less than 3 per cent. of the output and over the past eight years output has doubled with only a very small increase in the number of persons employed, and this has been achieved despite the high class of work upon which the firm is engaged, namely the manufacture of internal combustion engines.

There exist in England large foundries without a single apprentice. What is going to happen in ten years' time if someone does not take heed of this matter? It is most serious. One cannot learn this craftsman's trade from books. A would-be foundryman has to be on the job, know it himself and use forethought as well as foresight.

[During the presentation of this Address, Mr. Haynes exhibited numerous illustrations of the sort of work upon which his apprentices are engaged and showed groups of young people actually at work under the conditions described, in the shops of the National Gas and Oil Engine Company, Limited. Some of these have been reproduced in these pages in Figs. 1 to 6.]

APPROACH TO RECRUITMENT AND TRAINING*

By A. Talbot

In his address the Author pointed out that the newer entrants to the foundry industry are more adaptable than elderly ones—an important factor in the drive for production. He was of the opinion that recruitment should be carried out by the personnel in the industry. The organization within the industry had so far failed to inform the Ministries of Education and of Labour & National Service of either the claims for recruits or of the advantages the industry offers. It was suggested that parents of school-leaving boys should be informed, by personal contact, of the potentialities of the foundry industry as a career. The services of the B.B.C., the films and the Press could also be utilized. Efforts should be made to interest the craft teachers in the trade schools in foundry technique—a problem dealt with at some length. The phase most

* Abstracted from an Address presented to the London branch of the Institute of British Foundrymen, Mr. L. G. Beresford presiding.

stressed was demonstration, using the simplest of operations, to assemblies of schoolboys. A start was made in Walsall, and repeated in London. This resulted in interesting the craft instructors in the schools. Finally, a demonstration was given on television. The outcome has been that foundry practice has now been included in schools in north London.

An interesting point was the reception of parties of schoolboys. Limited to parties of twelve, they were shown the foundry, given luncheon and then they visited the machine shops—the opportunity was taken during the visit to ascertain the nature of employment most hoped for by the boys. It was generally found that none selected foundry work, as they deemed it to be obnoxious in various ways, yet all found it interesting.

The Author then criticized the publications directed towards recruitment by the industry. Though most were commended he said there were glaring faults in others which counteracted their good effect.

Handling Apprentices

The system outlined included a proper reception of the boy and the efforts to be made to increase interest in his work. At the end of a week, an opinion can be had of the boy's worth as a potential craftsman. This can be confirmed after a further fortnight. If he is deemed to be unsuitable, the parents are interviewed and advice rendered. If he is deemed to be worth training, then he continues for three months with his craftsman-teacher. Thereafter the boy works adjacent to his mentor, doing increasingly difficult jobs. Quality of workmanship is invariably insisted upon rather than quantity. No time is spent on the core bench as this is thought unworthy of inclusion. He is sent to the core-shop, however, if he has a run of wasters, where he replaces those he has lost. By the age of nineteen, if his work has been properly graded he should be thoroughly useful. Hereafter his speed of production can receive attention. A further year should make him a really competent moulder. During the whole of his training co-operation is fostered. There is an annual dinner, at which everybody from the chairman to the youngest apprentice is present. It is subscribed for by the men, the management being the guests. An added incentive is the exchange of apprentices.

The "poaching" of threequarter-trained apprentices by other concerns was rightly condemned by the Author. This only a sense of loyalty can prevent.

The Author was severely critical of the National Foundry Craft School on the grounds that if a foundry cannot train boys adequately themselves then they should make no attempt. The cost, of the order of £100, could, in his opinion be better spent. There was also an implied criticism of the non-practical character of the City and Guilds examination in foundry practice.

DISCUSSION

Opening the meeting, the branch-president had welcomed to the meeting Mr. S. H. Russell, a past-president of the Institute, and chairman of the development panel of the Council of Ironfoundry Associations; Mr. Kenneth Marshall, director of the Joint Iron Council; Mr. G. B. Judd; education officers and representatives of the Ministry of Labour, the South of England Ironfounders' Association and the Association of Bronze and Brass Founders.

MR. S. H. RUSSELL, who was invited to open the discussion, said all who had listened to Mr. Talbot's lecture would realize that he was a rather unusual foundryman, in that he devoted an enormous amount of time and care to the training and up-grading of his apprentices; not all foundrymen could claim either to have the same ability to do that or, in some cases, even the time to do it. Mr. Talbot had said that the younger the shop, the more modern was the practice. That was due to the fact that a young shop had young managers. He felt certain that he was right in saying that nearly all the responsibility was with management ultimately; but there was one further consideration: undoubtedly new practices were more easily carried out by new blood.

Craft Training Centre

There had been a further development in foundry recruitment at Walsall. The particular Youth Employment Officer there had taken the course at the National Foundry Craft Training Centre in order to familiarize himself with the processes in the industry and, having done that, he was more than ever convinced of the importance of the industry. He had succeeded in attracting quite a number of

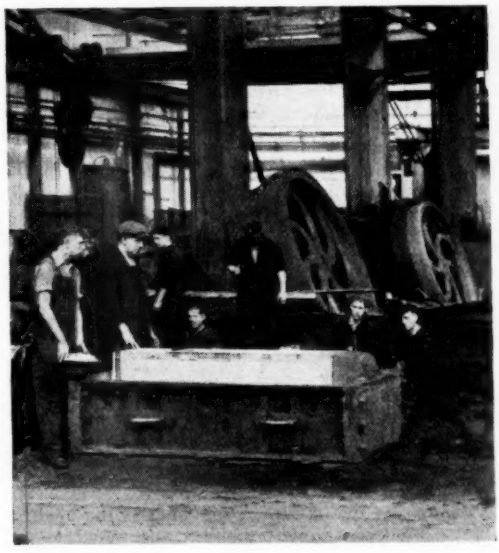


FIG. 3.—*Group of Youthful Moulders under the Supervision of a Skilled Man engaged on Heavy Casting Production. In the Background are Large Spoked-wheel Castings.*

FIG. 4.—*View of the Core-shop at the "National" Works in which Girls are almost exclusively Employed.*

boys into the foundries, and he stipulated the one condition that all the boys whom he did introduce should have the opportunity to attend the Centre. Yet one foundryman for whom he had found two boys was so short-sighted that he had refused to allow them to attend; he had said that he could not spare them, that he needed them for production. It did not need very much of that sort of thing to discourage an employment officer. On the other hand, Mr. Russell was perfectly sure that to be able to point to the existence of the Centre served as a wonderful lever when trying to bring pressure to bear on Youth Employment Officers. Referring to the provision of foundry equipment in secondary modern schools, he said there was considerable controversy as to whether or not anyone could be taught a craft in any school; and a modern school catered only for students of up to 15 years of age. A matter to which he attached much importance was that foundry managements should make a determined effort to get into contact with the teachers.

Parental Influence

Not all founders were so fortunate as Mr. Talbot in getting the fathers to take their boys along. Indeed, so far as parents were concerned, there was a peculiar and difficult problem. Now that the grammar schools were free, parents were very anxious that their children should pass the qualifying examination and should become pupils at the grammar schools, which represented the top level. Having got a child, who presumably was intelligent, into the grammar school, his parents considered that his foot was set on the ladder, and they regarded with considerable suspicion any suggestion of his going into industry. As to the training of apprentices, Mr. Talbot was completely right in emphasizing that a personal interest must be taken in every boy from the moment he entered a foundry. Both the Institute of British Foundrymen and the Council of Ironfoundry Associations published very valuable reports on the training of apprentices; and any far-sighted management must surely realize that the very bad days, which Mr. Talbot had described so graphically, had gone.

After expressing agreement that compulsory military training was a most formidable obstacle to any craft training, Mr. Russell came to the education of apprentices and their optional attendance at day school. Any of the boys who wished to attend day school were given facilities, but those who did not wish to do so—and there were many such—should not be forced. One long-term solution of the apprentice problem might be to reduce the necessity for the work of the skilled moulder; that had been done in some countries to a very considerable extent.

City and Guilds Examination

With regard to a City and Guilds examination, he said it was most difficult to devise a paper examination for a craftsman. The City and Guilds did not try to establish a purely practical examination: candidates must have a certain amount of theoretical knowledge, elementary though it may be. Until some genius could put up a scheme whereby a purely practical examination could be established and conducted fairly throughout the country, he was afraid the City and Guilds Institute could only conduct an examination which put practical questions in one paper and certain technical questions in another; and it was necessary to study on two or three evenings per week over a period of three years in order to be able to pass.

MR. TALBOT said the remark by Mr. Russell which had stuck in his mind particularly was that concerning foremen who had not sufficient time. A foreman should make time; and if necessary he should have an assistant. If he could not teach the boys, then the employer should get somebody who could. He had not said that the foundry training school was not doing a good job of work, but that he considered it was only doing a job which the employers themselves should be doing, that of making the boys good moulders, good citizens and good sports.

Indenture Schemes

In a reference to the Central Youth Employment Executive, which Mr. Russell had mentioned, Mr. Talbot said he had received a pamphlet on the previous day which dealt with apprenticeship schemes in 53 trades, and the foundry trade was not included, although the iron and steel trade was mentioned. He asked why, and urged that it was up to the C.F.A., the Bronze and Brass Founders' Association and the rest to tell the Central Youth Employment Executive about the foundry trade and its apprenticeship schemes and educational facilities. In the pamphlet he had mentioned there were details of indentures, details of the apprentice-

ship schemes, and so on. He would be glad to know whether the foundry trade had one, because he had never heard of one, and when his Company had drawn up their indentures they could not obtain any guidance at all.

Conference to be Organized

MR. K. MARSHALL said the matter of training and apprenticeship was so important that the C.F.A. had arranged for a conference to be held in the Spring. It was necessary to get the views of all who were concerned and co-ordinate them. A body such as the C.F.A., however, could not do all the work. Conditions varied in the different areas; in some areas there was a Mr. Talbot; some area organizations had good contacts with the education authorities, whereas others had not; in some areas the organizations and associations co-operated very well, whereas in others for some other reason they were not working together.

MR. MARSHALL ended by saying how pleased he was to be present and thanked the branch for having invited him.

Loyalty between Employers

MR. G. JUDD pointed out that Mr. Talbot could not be taken as a pattern and reproduced. He was unique. The majority of foremen were not inspiring teachers. That was why there was a need for the Foundry Craft Training Centre. The introduction of foundrywork into schools was an excellent step towards recruitment.

With regard to an employer losing a promising boy to another employer, he commented that loyalty between employers was sadly lacking in some quarters. This was a grave issue which created many problems. It was up to the Trade Associations to make greater efforts to foster loyalty between employers.

Purpose of Films

MR. W. R. BUXTON (Association of Bronze and Brass Founders) emphasized, as the London chairman of that body, that its members were as anxious as anybody else in the trade to further the recruitment of new blood. So far they had taken up a film on bronze founding produced by Mr. Frank Hudson who was very keen on producing films which would help recruitment. Mr. Buxton said he had tried to get the education authorities in Surrey and in London to take up the film, but so far with very little success. They had seen the film, and whilst they considered it was a very good one, it was rather too long for its contents to be digested by boys; it lasted for three-quarters of an hour. Films could help a lot if they were short and snappy and could be put over in about a quarter of an hour, giving the salient points. The Surrey education people would take any of the films which they considered would be useful to the boys in the schools, and would actually pay for them and take them into their own library; some of the schools had libraries for films and were anxious to get hold of them. From the meeting he had learned quite a lot which he would pass to his Association, and he hoped that some directive would come from the C.F.A. so as to get all the associations working on the same lines, getting into touch with the Central Youth Employment Executive and passing around the information they had already acquired.

MR. TALBOT was pleased to hear Mr. Buxton suggest co-operation on recruitment between the various associations, because, to date, he felt it was sadly lacking.

MR. A. A. MATTHEWS mentioned one or two points on which he disagreed with Mr. Talbot. For instance, it was suggested that foundrymen were ashamed of their industry; and he asked why. Then it was said that school visits had not resulted in recruiting any boys for the foundry; and in the occupational analysis, showing the pre-leaving school choice, some had chosen draughtsmanship and clerical work, and the rest woodworking, engineering and patternmaking. All those were clean jobs, that was why they were more popular.

MR. TALBOT said that he personally was proud of his craft, but he was not going to say that he was proud of the places in which many foundrymen had to work. Others might be more easily satisfied.

Awakening Interest

MR. R. B. TEMPLETON (past-president of the Institute and of the London branch) expressed his great interest in the paper and added his praise for the practical way in which Mr. Talbot had dealt with the vital problem of infusing new blood into the industry—a problem which had become the more

FIG. 5.—*Section of the "National" Foundry with Young Moulders working on Several Jobs, including Moulds for Hollow Cylinder Castings (Foreground) to Loam Moulding (Centre).*

FIG. 6.—*Apprentices engaged on Smaller Work at the National Gas and Oil Engine Works.*

acute to-day because it had been neglected for so many years. There was a very wide gap to fill in the recruitment of craft apprentices. Every emphasis towards progress in the industry during the last twenty years or so had been in the direction of producing better metals, improving working conditions and amenities, achieving better costing, estimating and marketing, and management; yet the thing needed most had been neglected. It was extraordinary that until quite recently there had been no organized facilities for training in the craft of founding; yet it was the very basis of everything, for without it the industry must eventually collapse. The scheme outlined by Mr. Talbot was one of many which Mr. Templeton had found taking shape to-day in the larger works and groups of works. It was a very welcome indication of a great awakening of interest.

Craft training might be said to be mainly a matter of concern to the jobbing foundries, but it was also important to the mass-production foundries, for there never had been a casting or type of casting made in such foundries which at some time or other had not been made as a prototype, or made in pilot quantities, in some jobbing foundry. Therefore. the mass-production units were indirectly dependent on the craftsman moulder or core-maker.

"Passing the Buck"

During the last few months he had visited more than a hundred foundries, trying to obtain recruits for the National Foundry Craft Training Centre at West Bromwich. He had heard many opinions on what should be done and how it should be done. but every person to whom he had spoken had agreed that something must be done, and done quickly, if the industry were to maintain its position in the national economy. Many directors of companies, general managers and others had said that it was a splendid idea, but they had no boys to train, and could not get them because of the competition of other local industries. It was said that the present-day youth did not wish to learn a trade, that he preferred to be an errand boy or to get an office job, or that his mother wanted him to have a white-collar job, and certainly objected to him working in a foundry. That was really no answer; it was merely an excuse for leaving it to the other fellow to do something.

It was of no use waiting for boys to apply for jobs; they must be sought out, as Mr. Talbot had said. If a foundry were short of work or of orders, management did not adopt a *laissez-faire* attitude; it made its salesmen get a move on, and the managing director too went out on to the road. Mr. Templeton suggested to those who could not get boys that they should see the headmasters of their local schools and colleges, ask them to lunch at the works and get them to organize visits by school-leaving boys, so that they could see how castings were made. The results would be surprising.

Mr. Templeton suggested that Mr. Talbot's own scheme of training might be improved by providing for his boys a term or two at West Bromwich and suggested that a prize for his best lads could be such an arrangement. The all-in cost per boy per term did not exceed £30, which included fees, hostel charges, railway fares and wages.

Finally, he summed up the solution of the problem under three headings:—

(1) More interest and drive by top management must be shown in recruiting and training boys.

(2) More co-operation should be shown by the trades unions.

(3) More help should be elicited from the educational authorities, and more guidance for the school-leaving boys. Boys must be taught to appreciate that the learning of a craft was something which would stand them in good stead all their lives. and that it was far better for the future to get their hands soiled, than to wear out the seats of their pants on an office stool or by riding a butcher's bicycle.

Widespread Ignorance of Foundrywork

MR. DAY, giving an example of how he tried to measure-up the problem, said he had one day received a telephone message from the foundry gatehouse that there was a boy wishing to be apprenticed; immediately afterwards, on the internal telephone, he received a message to see his directors. He had had to make a choice, and he had chosen to see the boy.

After the visit of the Grey Iron Founders' Productivity Team to America, Mr. Russell had stated at Ashorne Hill that it was intended to do something on American lines to advertise the industry. The difficulty was that the foundry industry in this country did not tell the world what it had to offer. Some engineers who arrived to

order castings had never seen a foundry; they used the products, but did not know how they were made. When taken into the foundry they were amazed and said it was wonderful to see how things were done.

Upgrading

MR. MAY said there had always been difficulty in getting boys into the foundries; there were other trades which offered what appeared on the surface to be much better jobs and, what was more important, opened very many more avenues for further advancement. Therefore, he suggested that the foundry trade would recruit better by upgrading than by apprenticeship schemes, and that some arrangement should be made with the foundry unions to bring about upgrading on a more wholesale scale.

MR. B. LEVY said there was a printed standard indenture which was issued by the Engineering and Allied Employers' Federation and which could be utilized by any foundry employer for a sound apprenticeship scheme. The first thing which parents asked when he was going to employ lads concerned the future prospects of employment and wage rates; the employer had to explain these matters, not only to the lads themselves, but also to the parents.

MR. W. WILSON, commenting on the point that many foundry foremen had no time to deal with recruitment, said that none of the foremen would have a job eventually if they did not get recruits. He was very critical of the foundry stand at the Festival of Britain. Again, at the Exhibition at Olympia there was a lovely C.F.A. stand, but there seemed to be apathy there concerning the introduction of recruits to the industry.

Vote of Thanks

MR. D. G. BISSET, proposing the thanks of the meeting to Mr. Talbot for his address, said it had proved to be provocative, obviously due to his fervid enthusiasm. He had given his hearers much to think about, and he could be assured that the salient points he had put forward would not be lost sight of.

It would be noted that Mr. Talbot was concerned primarily with the craftsman; and Mr. Bisset was in hearty agreement with him. In spite of Mr. Talbot's dislike for the Foundry Craft Training Centre at West Bromwich, Mr. Bisset claimed to be one of the originators of the starting of the Centre, it was established for the express purpose of training and the emphasis was all on craftsmanship.

MR. R. B. TEMPLETON, seconding, said the need for what had been advocated was beginning to sink into the industry, and he believed that wonderful results would be achieved in the next few years. Mr. Talbot, he added, had been provocative, but in a friendly and instructive manner.

MR. TALBOT, responding, said, on the recommendation that better facilities should be provided for dealing with boys, that his firm had given him full backing and all firms could do the same. With regard to the Engineering Employers' Federation apprenticeship scheme, it should be made known to all concerned. Where there was a good foundry, he continued, why not ask the men there whether they had boys who would come in. Finally, if he could assist any members who had ideas on recruitment, he would be glad to do so.

WRITTEN CONTRIBUTION

MR. R. HANSFORD wrote that he was greatly impressed by the able manner in which Mr. Talbot dealt with his subjects; he left no one in doubt of his appreciation of the problems facing the foundry industry nor of his earnest desire to expedite a return to improved conditions. The following are culled from his remarks:

Problems

The urgent need is for co-ordinated action on the part of the industry as a whole if the total extinction of craftsmanship in the foundry is to be avoided. The moulding shop, the fact must be faced, has superficially a much less congenial environment than is to be found in, say, a modern machine-shop or fitting-shop in engineering, and this has an adverse effect upon recruitment. The trade cannot even be regarded as a popular trade, excepting possibly in very few areas in this country which have a foundry tradition, and even in the latter, it is doubtful if tradition and inherent skills are still sufficient in themselves either to keep people in the foundry or to attract others to it. There are so many other opportunities where earnings are good, where the working environment is better, the work less dirty and less arduous, and where the prospect of regularity of employment may appear more assured.

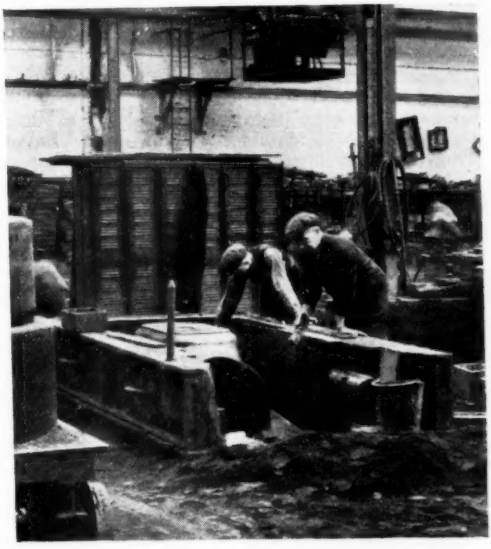


FIG. 7.—*Apprentice and Senior Moulder working on the Mould for a Large Engine Base, also at the "National" Works.*

More Views on Recruitment

It would seem to follow that, to be successful, any co-ordinated action on the part of the industry to improve its position must in some other ways overcome these basic handicaps. Much has already been done in the industrial welfare field to improve working conditions, but foundrywork cannot become a clean job and perhaps can never achieve the standard many regard as essential in a congenial job. An all-round improvement, including a return to pride of craft in the "skilled" section of foundry work can only come back gradually as a result of long-term planning, which must be assured of the co-operation of trade unions and of the Schools.

Practical Steps

A comprehensive survey of the labour position in foundries should be made by a responsible body to incorporate the expected requirements over the next few years. For obvious reasons it would have to be carried out on a regional basis.

This would enable the authorities to know how many recruits are considered necessary to make up present deficiencies, and to allow for expected losses on account of age, etc., during the period. The required frequency rate of intake should also be known. Agreement must be reached with the existing craftsmen, through their unions, to allow a larger ratio of apprentices to journeymen, if such be necessary. The present ratio seems to be universal at 1:5. At present it appears that even if apprentices were available, they would not be allowed to start work unless the craftsmen agree to an alteration of practice.

Instructors

Apprenticeship training, to be successful, cannot, in the writer's view, be allowed to go on relying upon the training methods still in use in many shops. The boys should be supervised and taught by a carefully chosen full-time instructor—a first-class moulder interested in training young people, or, one capable of being taught to regard training of boys as a satisfactory career. Evidence exists to show that this can be done on an economic basis. Such a plan must also have wider aims and opportunities for those who, having been trained as competent craftsmen, have ability to go forward to foremanship, managership, and so on.

Another angle which might be worthwhile exploring is where young persons now find themselves in the position of not having undertaken trade apprenticeships, but regret the fact; in short, the acceptance of candidates of higher age levels to enter into apprenticeship agreements. Debatable points do arise in that the older apprentice might not prove to be so receptive in mind, or as capable, physically, of giving the required finesse to his work as his younger colleague, but, conversely, this might be offset by virtue of the fact of having attained a more responsible age. Foundries would have to make the best possible use of available skilled labour and use other labour for less-skilled work.

Captive Foundries

Progress cannot be made so long as the outlook persists that almost anything is good enough for the foundry. A "captive" foundry (that is, a shop run by a company whose main manufacturing interests are in other things, and who use the foundry to provide accessories and services) cannot hope to play a part in restoring the foundry trade so long as this side of their activities is regarded as a side line, almost a necessary evil. This type of foundry and other jobbing shops who are compelled to produce at uneconomic or barely economic prices to help-on the sale of other main products, rarely has the money spent on it necessary to provide the best equipment. Some foundries are forced by their parent company to produce castings at dictated prices, usually based on a flat rate of X/- per cwt. This enables the parent company to readily compute the so-called value of the casting content of their finished article, but in many cases the dictated figure is hopelessly uneconomic. In many cases, foundries which worked under such adverse conditions fell slack periodically and solicited orders from outside sources in order to keep their personnel occupied. They quoted prices around their own uneconomic figure, thereby establishing a general price war, which in due course knocked the bottom out of the trade. On the question of foundry equipment, in many shops the plant in use is deplorable, in others it may be fairly good, but so often inadequate. This itself is a deterrent to recruitment.

Finally, the writer refers to the importance of full acknowledgment by all concerned of the almost entirely different set of labour problems which are involved in the production of one-off, in relation to 1,000-off, jobs. So often comparisons are made of a mechanized shop's 50-tons-plus, per week, being set against the jobbing shop's 10 to 15 tons.

Marine Research—A Vast Field

Modern trends in ship research were discussed by Dr. S. Livingstone Smith, director of research of the British Shipbuilding Research Association and a vice-president of the Institution of Mechanical Engineers, in the course of the 24th Thomas Lowe Gray lecture at the Institution's headquarters in London recently. Progress in Britain in the sphere of shipbuilding research was greater than elsewhere, Dr. Smith said referring to the large amount of work carried out by the Admiralty, the B.S.R.A., the Department of Scientific and Industrial Research, Lloyd's Register, individual firms, and certain universities. The field of research in naval architecture and marine engineering was a vast one, and there was still some vital information to be won.

Dr. Smith then proceeded to deal with problems posed and progress made in the four basic spheres of ship research—ship structure, hydrodynamics, ship performance, and ship machinery—and dealt with the problems relating to gas turbines which must be solved before they can be established as a means of marine propulsion. Research was the key to maintaining Britain's primacy in shipbuilding, he concluded, and the revival of keen foreign competition in what was once Britain's preserve was a further exhortation to increased effort.

Casting a Stainless-steel Propellor*

The pattern supplied for a four-blade, 8½-ft. dia. stainless-steel marine propellor was found to consist of a single blade mounted on a 90 deg. hub section, and the standards involved hardly made the job any easier. The blade widths had to be accurate within plus $\frac{3}{16}$ in. or minus ¼ in. or 2 per cent. of designed dimensions, whichever was the greater tolerance. The diameter was to be accurate within a minus tolerance of 0.5 per cent. Distance between centres of the blades was to be 90 deg., plus or minus 15 min. Each blade was to track from the shaft centre within a plus or minus angle of 15 deg. min. at the tip. The alloy specified was type 410.

An eight-piece flask (four for drag sections and four for cope sections) was used to form and contain the complete mould. The flasks were first levelled up. A spindle foot was fastened to the bottom-plates of the flasks. The spindle (perpendicular to the bottom-plates) was inserted with a sweep board mounted on it. The bottom of the hub section was swept up and prepared for making the first blade. The single-blade pattern was then placed on the spindle. Every effort was made to maintain the original precision. A tripod template rested on the pattern blade and a level was placed on the template to indicate whether the blade was horizontal or not. The pattern was secured above and below by wedges, so that it could not be moved in any direction during ramming. The spindle foot was divided by 90 deg. locations and had stops at these locations against which the blade was held. The ramming-up was started.

While the drag section was being rammed, the level was constantly consulted to maintain the initial precision. First the drag was rammed, joints were cut, and the mould prepared to receive the cope. The cope was then rammed up with the head placed over the hub. After the cope section was rammed, it was lifted off, the blade pattern taken out, and then the pattern was rotated into the adjacent quadrant. The next three sections of the mould were prepared in the same way as the first section. A gate was made (2½-in. dia. down-gate) which led into the bottom of the hub. A large runner box was rammed-up on top of the cope over the down-gate.

After the mould was dried, the assembly of the copes and drags was started. As the copes and drags were put together, the seams were filled up and with the last cope the hub core was inserted. A large bell head was used to feed the casting. The pouring weight was 6,500 lb. and the casting proper weighed approximately 4,000 lb.

* Extracted from an *Iron Age* article "Problem Castings are turned into Production Jobs," by T. J. McLeer.

American Research Trust

Richard S. Morse, president, National Research Corporation, Cambridge, Massachusetts, has announced the formation of the National Research Corporation Scientific Trust to which a portion of the company's net income has been contributed for the year ending December 31, 1951. Mr. Morse believes there is a real need for industrial support of unrestricted basic research work, and that through the establishment of trust funds of this type it will be possible to give effective aid on a long-term basis to fields of science essential to the future of the expanding industrial economy. Trustees of the fund are Dr. Julius A. Stratton, vice-president and Provost of Massachusetts Institute of Technology; Mr. W. A. Coolidge, chairman of the Board of National Research Corporation, in addition to Mr. Morse.

New Catalogues

Induction Heating. Two four-page leaflets Nos. 78 and 79 received from Birlec, Limited, of Tyburn Road, Erdington, Birmingham, 24, deal respectively with surface hardening and localised heat-treatment. Whilst of major interest to the engineering side, the one on localised heating has interest for those foundries which cast gear wheels and the like. The leaflets are available to our readers on writing to Erdington.

Grinding Wheels. The Norton Grinding Wheel Company, Limited, of Welwyn Garden City, Herts, have sent us "List Prices of Norton Grinding Wheels" and a folder "Mounted Wheels and Points." The former is a 38-page booklet and *mirabile dictu* actually tells what one has to pay for the innumerable articles listed. Additionally, much data are included as to dimensions of the goods available. Here and there the types and sizes carry a number which can be used as a code when telegraphing—a system which is worthwhile extending. The folder has been so treated and here, with such a multiplicity of tools available, the advantages are obvious. Both these publications, which are unquestionably of real use, are available to our readers on application to Welwyn Garden City.

Dust Collection. Keith Blackman, Limited, of Mill Mead Road, London, N.17, has recently issued a 26-page well-illustrated brochure covering a range of unit dust collectors suitable for use with grinding machines and similar dust-creating plant. It is stressed nowadays that dust should be eliminated at the source of generation and these essentially neat and compact units are of the type suitable for use in the fettling shop. The choice of colour for this brochure has not been too happy. The reddish-brown ink used is of somewhat too dark a tint. Thus, in some of the well-laid-out pages it detracts from the balance of the matter. The reviewer makes the reservation that it was being examined under artificial lighting on a rather dull day. As go-ahead foundries are now amassing as much information as possible on dust collecting, this one should certainly be included. It is available to our readers on writing to the Publicity Manager of Keith Blackman at the address given above.

Watt-Boulton Engine

A working model of the 150-year-old Watt-Boulton steam-engine in Dudhope Museum, Dundee, is being sent from America. Its arrival will introduce a new factor in the discussions which have been going on regarding the future of the original. A proposal to hand the famous old engine over to a museum in Edinburgh is being opposed by the Dundee Institute of Engineers. The model, one-tenth size, was built by the late A. J. Scott, who emigrated to America in 1913. He worked with Carmichael's engineering firm in Dundee, and assisted in the installation of the Watt-Boulton engine in Dudhope Museum in 1898. He was so interested in it that he made a careful note of the measurements, and later made the model at Westmont, Penn., U.S.A.

Mr. Scott died last year and Dundee Public Libraries Committee was informed of the existence of the model by his brother, Mr. David P. Scott, of Edzell. Mr. Scott's widow agreed to present the model to Dundee Museum. The model can be worked by compressed air or electricity. The committee has agreed to accept the model.

BRITISH RAILWAYS has placed an order for 20 new standard all-steel railway carriages with Charles Roberts & Company, Limited, Horbury (Yorks). The company has enough work on hand to ensure capacity working throughout 1952.

Hardenable Pewter

From *Tin and its Uses* comes the information that pewter and Britannia metal can be fabricated by casting in the desired shape or by spinning or hammering sheets produced by rolling-out slabs of the cast metal. Cast and spun or hammered parts are often united in the same article by soldering, as when cast bases, spouts or handles are soldered to spun bodies. While cast pewter vessels keep their shape well, some spun articles tend to sag and distort after a few years of use; teapots are specially prone to this defect because they are repeatedly filled with boiling water and while loaded in this way are lifted and bumped; each occasion may add only imperceptibly to the distortion, but eventually it becomes plainly noticeable.

Modifications

The attempt to overcome this tendency by hardening the pewter with more antimony or copper results in an alloy which is too stiff or brittle for spinning or hammering, although quite satisfactory for casting. Recently there was discovered in the laboratories of the Tin Research Institute a modification of pewter which is considerably harder than ordinary pewter in the cast form, but which softens during rolling into sheet, so that it can then be spun or hammered, and then fully hardened again by heat-treatment.

The modified pewter composition contains 1½ per cent. of bismuth in addition to the usual proportions of antimony and copper. A typical composition is given in Table I, together with that of ordinary pewter.

TABLE I.—*Typical Composition of Pewter.*

	Composition (remainder tin). Per cent.			Vickers Pyramid Hardness.		
	Sb.	Cu	Bi	As-cast.	As-rolled and spun.	Heat-treated for 3 hours at 150 deg. C.
Ordinary pewter..	6	1½	—	23	13	18
New and recommended pewter	6	2	1½	29	13	28

Heat-treatment

At the temperature of heat-treatment, pewter is likely to take on a bluish tarnish. This tarnish can be polished off, or can be avoided by the addition of 0.1 per cent. of phosphorus during melting, in the form of phosphor-tin containing 5 per cent. of phosphorus.

Gas Council Exhibit

The use of gas-heated appliances in four main branches of industry will be featured on the Gas Council stand at the British Industries Fair, Castle Bromwich, this year. The subjects for special mention are foundrywork, heat-treatment, glass-working and metal-spraying. The type of equipment shown to illustrate a foundry production line will include core- and mould-dryers, ladle and blacking dryers, torches, and crucible furnaces. In addition, this section will include equipment used in the foundry, including moulds, ladles, cores, etc. In the heat-treatment section, the exhibits will show the range of temperature covered by gas-heated appliances, from low-temperature salt-baths and tinning baths, through medium-temperature natural-draught furnaces and forced-air-circulation ovens, to high-temperature, natural-draught furnaces, and crucible furnaces.

Time-limited Enactments

By F. J. Tebbutt

The Emergency Laws (Miscellaneous Provisions) Act 1947 (and a similar one 1946) provides machinery for continuing enactments otherwise time limited to expire, if thought necessary, just by the issue of an Order in Council. A number of enactments—including provisions of Acts, Rules and Orders and the like—were by the 1947 Act down to expire on December 10, 1950, but before this date an Order in Council continued them to December 10, 1951. Now, recently, another Order in Council keeps them in operation until December 10, 1952. But a point which should be noted is that the present Government's spokesmen during the course of the Order being debated in Parliament, stated that they intended to examine these during 1952, to see if any can be terminated or otherwise continued in Acts of Parliament, if thought desirable.

Patents Act 1949 and Registered Designs Act 1949

Apart from the power to continue given in the 1946 and 1947 Acts mentioned earlier, by Orders in Council, there are provisions in the Patents Act 1949 which are time limited to expire, the date laid down in the Acts being December 10, 1950. There has been an Order in Council continuing this particular provision until December 10, 1951, but now an Order in Council continues it until December 10, 1952. This provision gives Government departments power to make, use, exercise, or vend any invention, if for certain special purposes (one being if in pursuance of the national interest). The effect of this is to allow dealing in patented goods or articles by Government departments. A somewhat similar Order relating to the use of designs under the Registered Designs Act 1949, continues this provision to December 10, 1952.

Mould Coat Mixture

By B. W. Southgate

A mixture developed by the writer for coating moulds is made up of 1 gallon of paraffin, 2½ lb. of core gum, and 2½ lb. of plumbago. The writer had experimented with these three materials, and has now been using the composition in his foundry for almost a year with great success. At the time of these experiments the foundry was using a proprietory mould coat, which created a nuisance owing to the heavy fumes given off the mould after casting, which made everyone in the vicinity liable to cough. Moreover, the material was also corroding the steel box-parts.

It has been found that the components of this mould coat readily mixed together. It was tried out on several "problem" jobs with good results. These were cast with the metal at a temperature of approximately 1,400 deg. C. in grey iron, and taking the normal moulding precautions the results showed that most of the scabs had been eliminated. The castings stripped cleanly without any burning-on of the sand. Castings of the ½ to 5 cwt. range are being treated successfully.

The mould coat can be thinned down if required by using less plumbago or core-gum, and may be sprayed on green-sand moulds by the use of a 1-pint air spray gun. There is, however, one disadvantage with the mix: the materials in suspension settle after five minutes or so—a difficulty overcome by the use of a bubbling air pipe put into a drum of the mix to keep it turbulent and in suspension. The writer wonders whether other foundrymen have tried this, or similar mixes.

Copper-base Non-ferrous Ingots*

By W. G. Mochrie

The making of copper-base non-ferrous alloy ingots is not quite the straightforward operation that is commonly supposed. There are various economic factors, the influence of which may vary from firm to firm, but which nevertheless affect the industry as a whole to a very marked degree. The most important of these is that the ingot-making capacity in this country far outstrips the demand, and while this may be a very palatable state of affairs to the customer, it can have a very sobering effect on those within the industry. To compensate as much as possible for this surplus capacity, the larger firms particularly are so placed with regard to plant that a certain changeover in methods and materials is possible. It is in such factories that a greater degree of refining can be accomplished, where a smaller output tonnage can be effected by utilizing a longer time-cycle in the processes. Another important consideration is that the ingot industry is in competition with other industries for the same material. This, of course, must govern the price of incoming metal and its value outwards. Against this there is always the competition of prices of ingots compounded from other materials.

Moreover, in the actual refining, methods, plant and practices have been decided from experiences within each works. The refining processes with such materials as are taken into the works do not follow the textbook procedures laid down (and which are fairly common knowledge) for the refining of metals from the ores. Whilst the refiners' material is in the main of much higher metallic content, the concentration of other alloying metals involves treatments quite divorced from standard academic refining. The industry must, in consequence, necessarily be a very complicated business, and it is proposed to give only a very brief review of the nature of the work involved, over as wide a cross-section as possible, concentrating more on the semi-refining, rather than the straightforward melting and alloying.

Sorting

The sorting of all redundant metals before any melting or refining is of paramount importance. First, it is germane to consider the materials now thrust upon the refiners, their composition and appearance and the means available for their identification. Taking the means, first, the inspector and sorters' tool-kit comprises a magnet, hacksaw, file, hammer, a sharp edge (pocket knife) and, to a much lesser extent, various acids. An electric-resistance meter has been employed for special purposes, but is not in universal use. All the tools are used individually or collectively to examine hardness, pliability, fracture and colour with, of course, shape and size.

Against this, the types of alloys coming back into industry are worthy of examination and Table I gives a description on very broad lines, without going into detail, with regard to actual composition; for instance, gunmetal, as is wellknown, covers quite a number of different alloys, as varied in their value as in their composition. Moreover, the Table includes only those alloys predominantly associated with their mode of manufacture. Such redundant material reaches the refining industry through several channels, partly from the engineering industry, from machining operations (which material may or may not go through the merchant's yard) together with the accumulated and partly-segregated material from domestic and public-utility sources. (Quite a substantial amount of process scrap goes back to the semi-manufacturer from whence it came, either in the same form, *i.e.*, swarf and turnings, or as an ingot, billet, slab or ladle skull (shell).)

TABLE I.—*Alloy Types According to Points of Origin.*

Origin.	Mode of forming.	Alloys.
1. Foundry ..	Sand ..	Gunmetal, phosphor-bronze, aluminium-bronze, silicon-bronze, manganese-bronze, brass, lead-bronze, nickel-silver, brazing metal, etc.
	Gravity die	Brass, aluminium-bronze, gunmetal, zinc-base, manganese-bronze.
	Pressure die	Brass, tin-base, zinc-base.
2. Rolling mill ..	Hot ..	Brass, gunmetal, phosphor-bronze, nickel-silver.
	Cold ..	Brass, tombac, copper.
3. Extruding press	Die ..	Brass, manganese-bronze.
4. Hot forging ..	Hammer ..	Brass, manganese-bronze.
5. Stamping ..	Press ..	Brass, phosphor-bronze, tombac.
6. Forming ..	Cupping and spinning	Brass, tombac.

Classification

Incoming scrap may be classified into (1) finely-divided material, (2) contaminated or composite assemblies, (3) material of low metallic content and (4) solid scrap. The finely-divided material, in the form of swarf, small punchings, etc., is largely segregated at the source and is not manually sorted in the normal way. The contaminated assemblies—for instance, switchgear parts—are dismantled by hand using any suitable means, although where large numbers of parts are involved they can be treated mechanically. Thereafter, the component parts are sorted into their respective categories. The low-

*An excerpt from an Address given before a meeting in London of Southern Region members of the Association of Bronze and Brass Founders, Mr. W. R. Buxton presiding. The Author, who is attached to Tyseley Metal Works, Limited, was speaking as a member of the technical committee of the British Bronze and Brass Ingot Makers' Association.

TABLE II.—*Possibilities of Mistaken Identity in Normal Sorting Techniques for Copper-base Alloys.*

	Al bronze	Ni Al bronze	Brass, cast	Brass, rod	Brass, hot-rolled	Brass, die-cast	Brass, cold-rolled	Brass, forging	Mn-br	Mn-br (forging)	Ni-plated brass	Tinned copper	Chromium-plated brass	Nickel	Stainless steel	Monel	Gunmetal (Pb free)	Gunmetal (with Pb)	Phos bronze	Phos. bronze (with Pb)	Si-bronze	Al-brass	Lead bronze	Gilding metal	Brazing metal	Tinplate	Nickel-silver
Al-bronze		X		X	X	X	X		X	X								X				X					
Ni Al-bronze	X			X			X		X	X								X				X					
Brass, cast						X		X	X	X											X			X	X		
Brass, rod	X	X				X		X	X												X						
Brass, hot-rolled	X						X		X													X		X	X		
Brass, die-cast	X		X	X				X	X	X											X						
Brass, cold-rolled	X	X			X				X													X		X	X		
Brass, forging	X	X	X			X			X	X							X	X			X						
Mn-br (-brass)	X	X	X	X	X	X	X	X									X	X			X	X					
Mn-br (forgings)	X	X	X			X		X									X	X			X						
Ni-plated brass												X	X	X	X	X										X	X
Tinned copper											X		X	X	X	X										X	
Chromium-plated brass											X	X		X	X	X										X	
Nickel											X	X	X		X	X											X
Stainless steels											X	X	X	X		X											X
Monel, etc.											X	X	X	X	X												X
Gunmetal (Pb free)	X	X						X	X	X								X	X	X	X		X				
Gunmetal (with Pb)	X	X						X	X	X							X		X	X	X		X				
Phosphor bronze																	X	X		X	X		X				
Phosphor bronze (with Pb)																	X	X	X		X		X				
Si bronze			X	X		X		X	X	X							X	X	X	X			X				
Al brass	X	X			X		X		X																		
Lead bronze																	X	X	X	X	X						
Gilding metal			X		X		X																				
Brazing metal			X		X		X																				
Tinplate											X	X	X														
Nickel silver											X			X	X	X											

Constituents
Cu Al (Fe)
Cu Al Ni Fe
Cu Zn Pb Sn
Cu Zn (Pb)
Cu Zn
Cu Zn Al
Cu Zn
Cu Zn (Pb)
Cu Zn Al Mn Fe (Sn/Pb)
Cu Zn Al Mn Fe (Sn/Pb)
Cu Zn Ni
Cu Sn
Cu Zn Cr
Ni
Fe Ni Cr
Cu Ni etc.
Cu Sn (Zn)
Cu Sn Zn Pb
Cu Sn P
Cu Sn Pb P
Cu Si (Zn)
Cu Zn Al
Cu Pb Sn Ni
Cu Zn
Cu Zn
Fe
Cu Zn Ni (Pb)

metallic materials, residues, for example, are treated outside the sorter's orbit. The solid scrap, *i.e.*, the material originating from the rolling mill through the stamping and forming process, will obviously have quite a different dimensional form from the material emanating from the foundry, forge or extruding press. However, all types and shapes have been included in Table II, which has been prepared

to show only the most frequently-encountered types of materials, annotated against materials of different composition with which, under certain conditions, they might easily be confused. The normal testing procedure, namely by visual examination with regard to shape, pliability, hardness, magnetic properties, as well as colour and types of cold, fresh fractures, and sub-surface skin, might not be a sufficient test to guarantee adequate sorting of those materials marked in the Table. On the other hand, any spot testing and any electrical-resistance method takes too long for normal sorting. Taking an example from Table II, if one considers a brass casting, of say, 65/35 copper/zinc, with lead and with or without tin, it may in original appearance (the most common means of identification) resemble a die-cast brass, which not only contains copper and zinc but also a most undesirable element for subsequent sand casting, namely aluminium. In shape, moreover, the casting may appear similar to a brass forging of considerably lower copper content, and not possessing the castability of a normal cast-brass composition. Again, manganese-bronze, probably the most frequent interloper, as a casting or forging is very similar in appearance to ordinary brass, and yet, of course, contains in addition to the copper and zinc, aluminium, iron and manganese. There is little difference also in the appearance of a silicon-bronze casting, the composition of which bears no resemblance to the brass. With gilding and brazing metal, these would have to be in the cast form for there to be any possibility of mistaken identity. Similarly, those materials which are suitably marked in Table II, could be confused. To elaborate on this point, giving the reasons and the fallability of the regular sorting methods, would involve more space than is available.

Scope of Ingots

The earlier remarks well illustrate the incompleteness of normal sorting procedures in guaranteeing the perfect segregation of all scrap as suitable material for the foundry furnace. Even under optimum conditions, the most that could be expected from any scrap material is metal of reasonable castability, disregarding melting loss, that will just give a so-called " commercial " casting. Where physical or mechanical properties have to be guaranteed or standard casting techniques maintained, an alloy of guaranteed chemical composition was, is, and always will be essential, whether that alloy is compounded in the foundry or elsewhere. Benvenuto Cellini was not bothered by test-bars or pressure tests, but had he used a pre-ingotted alloy for his Perseus, that model's foot might have been of the same composition and patina as the main part of the statue.

While virgin metal must always play an important part in the alloying of non-ferrous metals generally, unquestionably the interesting technique concerns that of the treatment of secondary metals for this purpose. It is on this material that non-ferrous founding must largely depend, as dictated by the laws of economics and, under to-day's conditions, by reason of the scarcity of virgin metals. Although established for a good many years, it is only quite recently (February, 1946) that constituent firms in the ingot industry have co-operated and become and been recognized as an organized body. The British Bronze and Brass Ingot Manufacturers Association, as this organization is known, comprises about 85 per cent. of the total *bona fide* ingot-manufacturing capacity in the country. The aggregate tonnage per annum is quite considerable, being 90,000 to 100,000 tons. A technical committee has been developed within the Association, concerned with technical matters not confined to the ingot industry, *e.g.*, close collaboration with the Association of Bronze and Brass Founders, the British Standards Institution, etc. Its representatives have investigated ingot manufacture on the Continent and in the U.S.A.

Refining

As previously pointed out, the sorting of redundant metals is a very necessary pre-requisite of the fire-refining processes, and in this respect, those merchants whose business it is to sort metals play a very important rôle in the over-all picture of the resuscitation of spent metals. It is essential that their material should be classified chemically into as close range-limits as possible, but it should be borne in mind that sorters are skilled men but not technicians, and from then onwards it is the business of the ingot manufacturer to eliminate the undesirable elements and reconstitute the original basic ingredients to a specified chemical composition. These limits are pre-defined, the British Standards Institution being the main guide for such compositions.

Tramp Metal

Considering next the tramp-metal inclusions and/or attachments in a parcel of, say, brass scrap; for instance, iron, it will be fairly obvious as to what procedure should be adopted for its removal. There are various means at the refiners' disposal, first of all, physical separation, wherein the iron attachments can be removed (and this is to be preferred to any other method); alternatively, where this is not possible, the metal can be subjected to blast-furnace treatment wherein the iron is slagged, but as this is wasteful in other metals it is invariably only resorted to as a last expedient. Under certain conditions, metal may be subjected to reverberatory-furnace refining. In the case of swarf, turnings and the like, magnetic separation is possible, after drying of the material, but an unintentionally adhering but nevertheless inevitable amount of contamination adhering to the iron has subsequently to be recovered, usually by fire-refining practice. The magnetted swarf, etc., still contains a small percentage of free iron, which can be removed by reverberatory practice. Another common impurity in brasses is, of course, aluminium, the elimination of which does not present the problems it once did. Brass ingots showing indications of " white heat " are very rarely encountered in these times. Magnesium is not unknown in this type of scrap, but, owing to its affinity for oxygen at remarkably low temperatures it is no sooner in the furnace than it is out again. Silicon, introduced with, say, silicon-bronze, is slagged out. Sulphur, a common pick-up from

Copper-base Non-ferrous Ingots

furnace gases, is, after suitable treatment, also slagged. In the best practices, a sample, known locally as a " set," is withdrawn from the furnace to ascertain whether the undesirable elements have been removed to completeness, and to determine the adjustment necessary before pouring. In large heats, drillings are taken from the first, middle, and last ingots poured for the final assay of the ingot.

The same applies in gunmetal-refining practice, but here it should be emphasized that, owing to the difficulty in removing or reducing lead in a mixture, it is of paramount importance that lead-free bronzes should be kept quite apart in the sorting stage from the leaded gunmetals. Contamination of one in the other reduces the value of the lead-free materials out of all proportion to the residual lead content.

Treatment of Residues

In the making-up of certain high-duty alloys, it is essential that certain hardeners should be made for addition to a standard base. Whether these hardeners or the base are produced from virgin or other metals depends on the refining capacity available in the works, the degree of refining possible and the amount of impurity permissible in the final ingot. From all these operations, skimmings, ashes and residues of all descriptions are subjected to further treatment for reclamation of the metal content. Some methods employ ball-mills for grinding and screening to extract the coarser material. In some cases, this is followed by washing and concentrating, which process is also used in refiners' work for the recovery of metal from foundry residues. This treatment necessitates a mill or suitable crushing plant, into the pan of which are added the residues, together with sufficient water to make up a fairly consistent paste, which is then transferred to a Whiffley table, the prime purpose of which is to agitate this paste in water over grooves on an inclined vibrating surface, the concentrated coarser metal coming off at one end and the waste or " fines " being discharged at the other.

These concentrates can then be dried and treated by the normal fire-refining process. According to the quality of metal originally contained in the residues, so does the ultimate mode of treatment vary, that is to say, whether for blast-furnace or reverberatory, but the latter is the more common. It is considered by some that this " wet " method of concentrating is to be preferred to furnace-refining, but this is a matter which the Author considers to depend on the ancillary equipment attached to each type of plant.

Laboratory Control

So far, it is felt that insufficient acknowledgment has been made to the rôle the chemical laboratory plays in the total refinery operations. It is responsible for determining the metallic content and quality of the incoming material; it follows this material through the melting or refining processes, determining when all injurious impurities have been eliminated and deciding on any necessary adjustments to the basic charge, and, of course, conducts the analysis of the final ingot. Special laboratory analytical techniques have been developed, as it is fairly obvious that a 5- to 10-ton charge of liquid metal cannot be held indefinitely awaiting results from the chemist, for by the time results have been made known, the metal bears no resemblance to the bulk originally sampled. In personal experience, for instance, copper, tin, lead and manganese on a gunmetal sample can be estimated in from fifteen to thirty minutes. For the final chemical analysis of the ingot, however, routines following established standard methods of chemical analysis are followed.

Refining Plant

With regard to furnaces, it will have been gathered by now that in the industry there are different forms of blast-furnaces and reverberatory furnaces. This latter type is composed, where refining is more important than straight-forward melting and alloying, of the stationary type of furnace, the capacity of which is on average about 10 tons. For the more straightforward work, rotary furnaces are more suitable and there are several different types, developed from truly rotary and semi-rotary installations. For the hardeners and special melts, there are the ½-ton tilting, lip-axis, centre-axis, and the good old stand-by, the pit-fired crucibles. Solid coal, coke, fuel-oil and, to a lesser extent, gas and electricity, are used for firing. There are also various types of continuous reverberatory furnaces, and modifications of muffle furnaces. Other plant includes magnetting machines of varying descriptions, as well as permanent magnets, and laboratories which may or may not include physical laboratories. Labour-saving devices in the form of mechanical aids are being increasingly employed. Endless-belt casting machines are used, either from slit gates in reverberatory stationary furnaces or from the rotary types of furnace. Certain member firms in the Association produce a smooth-top ingot for all grades of alloys, others, on the other hand, do not believe in producing this smooth-top ingot, as it does not exhibit the obvious signs of certain impurities, which are observable with the rough-top ingot, the latter being preferred by a large number of founders.

It will be appreciated, this is quite a large subject and the Author has found it difficult to determine just which points to emphasize. However, he hopes that he may have given some idea of what the making of a non-ferrous ingot entails, and has provided some food for thought, if not for discussion.

FOREIGN WORKERS had to be engaged by the Swiss Locomotive and Engineering Works, Winterthur, following a revived demand early in 1951. New orders received in the 12 months ended June, 1951, were 64 per cent. higher than in the preceding business year; 57 per cent. of the turnover in 1950-51 was for export. Sales were especially brisk in Diesel motors for Rhine shipping. Locomotive deliveries included 12 Diesel-electric units for the Franco-Ethiopian Railway.

Strickled-top Coreboxes

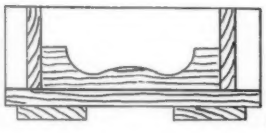
By "Checker"

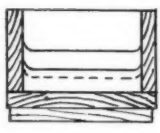
Many coreboxes are made with an open top which has to be levelled-off with a straight-edge strickle after the core-sand has been rammed in. When, however, only a small number of cores is required of this particular kind, and a corebox has to be made quickly and as cheaply as possible, it can then often be constructed in the reverse way with the flat surface at the bottom and its shaped portion at the top.

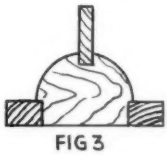
Fig. 1 illustrates section views of a corebox showing an outside frame and a shaped centre-piece fixed in the bottom. This gives a strong corebox which will withstand the production of a great many cores. It has a level strickled face at the top, on which the core will stand while being dried. A corebox of this type would in many cases be constructed in mahogany. To produce the same core when only one or two are required, it will be much quicker, especially from the pattern-making side, to make a corebox which would have the flat face downwards when the core is being made. In this case a frame would also be required, having two shaped sides, and shallow ends. These latter are rebated into the sides approximately $\frac{1}{4}$ in. to give constructional strength, and also to resist any outward pressure when core sand is being packed in position. It is usually an advantage, when making shaped sides of this kind, to nail the two pieces of wood together, and then work them to their correct shape to ensure they are both identical.

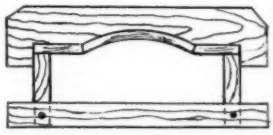
Fig. 2 shows this corebox and it will be noticed that no bottom has been included. This is in many cases an advantage, for the corebox can be placed on a flat coreplate and rammed up, then the corebox can be lifted straight off the core, leaving it on the plate. It will then be taken without disturbance to the core stove for drying. When the top of this core is being formed, a straight-edged strickle will of course be necessary, and must carefully follow the shaped contour of the corebox top. It is a good policy to inspect strickles periodically, and replace or correct those which have become badly worn. A strickle which is out of shape cannot possibly produce a flat surface on cores, and this discrepancy can at times cause trouble when they are placed in the mould. One advantage which can be clearly seen, is that the method shown in Fig. 2, for which job pine would be used, does save a considerable amount of timber. A disadvantage that excludes it from being used for the production of large numbers of cores, is that the radius formed at the bottom of the corebox (Fig. 1) cannot be reproduced in the cheaper corebox, and must therefore be formed by rubbing every core made.

Specially-shaped strickles have at times to be used on coreboxes, when the shape is such that it cannot be formed with a straight-edge strickle. Fig. 3 shows a corebox from which only a small number of cores were required, having the flat face downwards, and a shaped strickle for forming the upper face. Its shape corresponds to that cut out of both corebox sides. This strickle is positioned lengthways on the corebox, and is worked round the end portions. Protruding pieces are left on at both strickle ends, these are made a good fit over the corebox ends, and their shoulders ensure that the strickle and core shape cannot be misplaced in the length. Strickles are made with a chamfer on one side, this is usually about 45 deg., and the working edge should be about $\frac{1}{8}$ in.









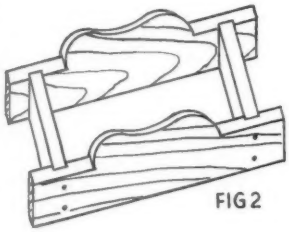
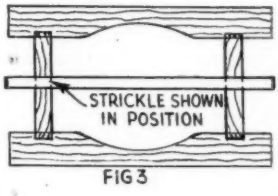


FIG. 1.—*Corebox Design with Shaped Portion in the Bottom.*

FIG. 2.—*Box re-designed so as to form the Shape with a Strickle.*

FIG. 3.—*Corebox and Strickle Equipment for a More-complicated Core.*



THE INSTITUTE OF INDUSTRIAL SUPERVISORS has arranged a week-end residential course for foremen and supervisors on "The Practice of Management" from February 29 to March 2, at Dillington House, Ilminster, Somerset. The inclusive fee for members is four guineas and for non-members five guineas. Further particulars are available from the secretary of the Institute at Bank Chambers, 47 Temple Row, Birmingham 2.

FROM FEBRUARY 1, and for the following three months, the Administrator of German Enemy Property is authorized to accept claims under the Distribution of German Enemy Property Act, 1949, in respect of German enemy debts. Claim forms in four categories are now available and can be obtained, on application, from the Administrator of German Enemy Property, Branch X, Lacon House, Theobalds Road, London, W.C.1.

Personal

MR. JOHN HASTINGS has been elected chairman of the Edinburgh and Leith Metal Merchants' Association. MR. W. T. DRUMMOND has been elected vice-chairman of the Association.

MR. GORDON R. BALL has been appointed to the board of the International Nickel Company of Canada, Limited. Mr. Ball is vice-president, general manager and director of the Bank of Montreal.

MR. L. E. SAKER, who has served for over 40 years with Lancashire Dynamo & Crypto (Mfg.), Limited, has been appointed chief engineer of the Willesden works of the Company. Mr. Saker is chairman of the design committee at Willesden.

MR. J. A. MACLEAN, of Dingwall, has been appointed representative of the Metropolitan-Vickers Electrical Export Company, Limited, in Canada. Educated at Dingwall Academy and Glasgow University, where he took his B.Sc. degree, he joined the firm in 1937.

MR. W. T. DOWNES who has been chairman of the Birmingham branch of the Institute of Export for the past three years, retired from that office on January 28. He was the first Birmingham member of the Institute and assisted in the formation of the branch in 1938. He is succeeded by Mr. S. A. Powell.

MR. E. B. PRESTON, who is in charge of the London office of C. A. Parsons & Company, Limited, engineers, etc., of Newcastle-upon-Tyne, is to retire towards the end of 1952. He will be succeeded by MR. J. L. PACKARD, manager of the Bristol branch of the company, and MR. I. CLUNAS will become acting manager at Bristol.

MR. R. F. W. GUY, formerly chief engineer of James Hodgkinson (Salford), Limited, mechanical stoker manufacturers, etc., has joined the consulting staff of Powell Duffryn Technical Services, Limited, as senior engineer. He will be attached to the company's Manchester office at Lords Chambers, 26, Corporation Street, Manchester, 4.

IN CONNECTION with the firm's 75th anniversary celebrations, the directors of Matthew Swain Limited, Newton Heath, Manchester, entertained 250 of the employees to a special tea at Belle Vue, Manchester, on January 11. The chairman of the company welcomed the guests, who afterwards spent an enjoyable evening at the Circus, special transport being provided.

MR. W. J. DRISCOLL has resigned from the staff of the British Cast Iron Research Association to become general manager of Cupodel Limited, a newly-formed company with interests in cupola developments in general and hot-blast equipment of Steinmüller design in particular. He will, for the time being, be operating from his home address: 86 South Road, Northfield, Birmingham 31.

MR. L. P. LORD, chairman and managing director of the Austin Motor Company, Limited, has left England on a round-the-world business trip. He will meet LORD NUFFIELD, head of the Nuffield organization, in Sydney, New South Wales, during a month's stay in Australia. He will then leave for New Zealand and British Columbia, and plans to sail for home from New York on April 30.

DURING 1951, workers in the Lucas organization—which includes Joseph Lucas, C.A.V., Rotax & Girling—received a total of £12,000 for ideas submitted through the workpeople's suggestions schemes.

Modern Solid-fuel-burning Domestic Appliances

The main purpose of the Coal Utilisation Council was to stimulate interest in and make it easier for people to acquire modern solid-fuel-burning appliances, said Mr. Eric Bellingham, director-general of the Council, speaking in Glasgow on January 18 at the Scottish premiere of the film, "Pictures in the Fire." These appliances, he continued, if used intelligently, burned coal more efficiently and to the public's greater comfort and satisfaction. It was not their object to try to get the housewives to make do with much less coal than they were getting now. The housewife had already had her share of solid-fuel economy imposed on her. Their main task was to ensure that, from the reduced quantity at present available the housewives got in terms of comfort and heat no less than from the pre-war quantities.

Referring to the innumerable old-fashioned inefficient ranges in existence in Glasgow, Lord Provost Sir Victor Warren said that, although he did not know where the money was to come from to modernize them all, the Corporation supported the C.U.C. in their aims. The Corporation were installing modern appliances in new houses under construction, and encouraged people in other houses to consider them. He said the greatest offenders, so far as smoke and what he called the "dark atmosphere" were concerned, were not the great factory chimneys so much as the domestic consumers.

The Countess of Elgin and Kincardine, chairman of the Scottish Women's Advisory Committee on Solid Fuel, outlined the work done by this committee, and invited housewives to take advantage of the information on modern appliances which the C.U.C. were arranging to have available in Glasgow, at 341, Bath Street, in March or April.

Quality of Blast-furnace Coke

In a Paper by F. J. Hewitt, H. L. Riley and F. Savage presented on January 9 to a meeting of the Coke Oven Managers' Association, the Authors state that a substantial contribution to an increased annual production of pig-iron, amounting probably to some hundreds of thousands of tons could be made by the up-grading of coke quality. The present shortage of coke means that pig-iron producers have little or no choice in their coke purchases and the blast-furnace quality of coke produced by the iron and steel firms is much superior to that produced elsewhere. Detailed examination of cokes produced in South Yorkshire and elsewhere has shown that two factors are largely responsible for the production of inferior blast-furnace coke. These are (a) inadequate preparation of the slack charged to the ovens and (b) incomplete carbonization. The present need for the most stringent economy in the use of any kind of fuel makes it imperative that immediate action should be taken to improve the quality of these cokes, at least up to that of coke produced at steelworks' coke-ovens. The existing situation means that hundreds of thousands of tons of coke are being wasted every year. This improvement could be brought about by stricter technical control of carbonization and the Paper makes clear the ways in which such measures could be applied.

SPEAKING IN BIRMINGHAM, on January 21, Sir Thomas Hutton, general manager of the Anglo-American Productivity Council, said that the economic crisis could be solved by a comparatively small increase in our national output. Even 10 per cent. increase would result from more effort and co-operation, he said, pointing out that that would not be impossible, as for three years there has been a 7 per cent. increase.

Anglo-American Dealings

The United States is to make available to the United Kingdom during this year 1,000,000 tons of steel, including scrap and pig-iron, in return for 55,100,000 lb. of aluminium, which will be replaced by America by the middle of 1953. This is an increase of 33,060,000 lb. on the total specified in the last agreement. The Americans are also to purchase 20,000 tons of tin at $1.18 a lb. (equivalent to £944 a ton). The 1,000,000 tons of steel includes 100.000 tons already allocated to the U.K. for the first quarter of 1952.

A statement issued by the Government recently gave details of the Anglo-United States metal agreement.

"The United States will help the United Kingdom to meet its most serious shortage, steel, and the United Kingdom will help to alleviate one of the United States' most serious shortages, aluminium, and will also assist the United States in getting supplies of tin.

"The United Kingdom requirements of steel for 1952 were reviewed in detail. On the basis of these requirements, and after allowing for supplies of foreign ore to be diverted to the United Kingdom, by arrangement between the U.K. and the U.S. steel industry, the United States undertook to make available to the United Kingdom for purchase during 1952 steel, including scrap and pig-iron now earmarked for the United States from overseas sources, to a total figure of 1,000,000 long tons. This includes the steel allocated for the first quarter in the previously announced arrangement.

"About 80 per cent. of the amount supplied will be steel, mostly in the form of ingots. This represents less than 1 per cent. of the total United States production. It has been agreed that the United States may vary the proportions between the steel products and the steel-making materials to be supplied.

"This will be of the greatest assistance to the United Kingdom in meeting its defence and essential civilian needs, and will help the United Kingdom industry to take care of some of the essential needs of other friendly countries for structural and plate steel, thereby relieving the pressure on overburdened United States facilities.

"In the absence of a change in the present supply situation, it is not anticipated that any of the steel to be furnished to the United Kingdom will be supplied in structural or plate or in shapes that are in serious short supply in the United States. Most of the steel will be supplied in the second half of 1952, when a portion of the United States steel expansion programme will have been completed. Deliveries to the United Kingdom will be confined to those items in reasonably free supply.

U.S. Non-ferrous Needs

"United States requirements for aluminium and tin were also reviewed. On the basis of these requirements, the United Kingdom agreed to make available to the United States a total of 55,100,000 lb. of aluminium. This represents an increase, to be spread evenly over the last three quarters of 1952, of 33,060,000 lb. of aluminium over the arrangements made recently with the United States by the United Kingdom. This quantity is equivalent to about 10 per cent. of the total United Kingdom annual supply. The United States has agreed that it will replace this aluminium by the middle of 1953. It is expected that much of the United States aluminium expansion programme will be in operation by that time.

"The United Kingdom has agreed to sell to the United States 20,000 long tons of tin during 1952, at $1.18 a lb. Both Governments agreed that it would be desirable if more normal arrangements for the conduct of the tin trade could be established as soon as possible. These arrangements will enable the United States to meet more nearly its essential tinplate requirements and improve its aluminium allocation to defence and civilian industries.

"It was noted that both countries would continue to use their best efforts to expand and accelerate their programmes for increasing production of scarce materials both at home and overseas.

"The two Governments also reviewed and expressed satisfaction with the progress which has been made through the International Materials Conference toward effecting equitable distribution of key raw materials."

The steel/tin/aluminium (and now rubber) agreements with the United States need to be considered against the overall background of the drain on our dollar resources, currently quoted at £547 million, and the announcement this week of a grant of a further $300 million (£107,142,000) from the U.S. The U.S. steel will cost over £40 million in dollars, while the tin sold will only bring in about £19 million, and the extra 15,000 tons of aluminium for the U.S. is a self-liquidating item. On the other hand, the transfer of 25,000 tons of rubber to the U.S. stockpile from ours will provide a redress to the extent of about £9 million. A pleasing feature is that the new direct loan is to be devoted mainly to raw materials and only very essential end-products and it is opportune at this particular juncture.

Notes from the Branches

Scottish Branch, N.E. Section

The January meeting of the North Eastern section of the Scottish branch of the Institute of British Foundrymen was held on January 16 at the Imperial Hotel, Arbroath, with Provost J. F. Webster in the chair. Mr. J. Gorman, of Greenock, presented his Paper entitled "A Cross-section of a Non-ferrous Jobbing Foundry."* In the course of his talk Mr. Gorman described with ample illustration the making of four different types of non-ferrous castings. First, he dealt with the large small-number-off job which has to be made with the minimum of equipment. Secondly, the making of repetition castings on a moulding machine was described. The problems of making a pressure-tested casting were next discussed and finally Mr. Gorman showed how he had made a bronze bust of Mr. Churchill using the lost-wax process. Mr. Gorman was congratulated on his Paper by many of the members present and Provost Webster proposed the vote of thanks, which was warmly accorded.

Lancashire

On January 21, at St. Helens Gas Show Rooms, a lecture was given to the Lancashire branch of the Institute of British Foundrymen by Mr. A. Kirkham and Mr. H. Taylor, both of Sir W. H. Bailey & Company, Manchester. The subject, "Castings for the Valve Industry," dealt with the moulding and casting of all sizes of valves from small ones to composite valves and pump bodies, weighing up to 5 tons. Slides were also shown illustrating the company's new foundries, which replace the old ones destroyed by bombing. The new premises, equipped with modern lighting and ventilation, have first-aid rooms and shower-baths for both male and female workers. Mr. J. A. Reynolds, of British Insulated Callender's Cables, Limited, presided at the meeting, which was well attended by local foundry executives and operatives. An animated discussion concluded a very interesting evening.

* Shortly to be published in the JOURNAL.

D.S.I.R. Appointment

The new chairman of the Mechanical Engineering Research Board of the Department of Scientific and Industrial Research is to be SIR ANDREW MCCANCE, F.R.S. He has accepted the invitation of the Lord President of the Council to succeed Sir Henry Guy, F.R.S., in that position. Sir Andrew will assume office next month.

One of the foremost metallurgists in the country, Sir Andrew, in his new appointment, will bring a wealth of knowledge and experience acquired in a long and outstanding career in which he has served industry and many technical societies and associations, both at home and overseas. In 1947 he was elected president of the Iron and Steel Institute, which, seven years earlier, had recognized his work by the award of its highest honour —the Bessemer Gold Medal. He has served, too, on the council of the Institute of Welding, as president of the West of Scotland Iron and Steel Institute, and of the Institution of Engineers and Shipbuilders in Scotland. He joined the Institute of British Foundrymen in 1929, and gave the "Edward Williams" Lecture in 1950.

Sir Andrew's industrial connections are many. His association with Colvilles, Limited, of which, in 1944, he became deputy chairman and joint managing director, began in 1919. In that year he also became managing director of the Clyde Alloy Steel Company, Limited. Chairman of the British Magnesite Corporation, Limited, he also serves on the board of the Steel Company of Scotland, Limited, Smith & McLean, Limited, the Lanarkshire Steel Company, Limited, to mention but a few of the companies with which he is identified.

Factories Acts Summarized

A handbook entitled "A Summary of the Provisions of the Factories Acts, 1937 and 1948," has ben prepared for Lever Bros. & Unilever, Limited, as a guide to those of its employees who are responsible, under the company, for carrying out the provisions of the Acts. In the handbook an endeavour has been made to translate the substance of each important section into more concise and simple language, and, where necessary, to explain its meaning. It is, of course, easy to appreciate that some of the original wording is thereby lost, and it is suggested that the Acts or the Inspectorate should be consulted on points of detail. A list of the various regulations, welfare Orders, and others of general interest is given in an appendix.

Cornish Mineral Resources

A deputation from the Cornish Mining Development Association had a meeting with Viscount Swinton, Minister in charge of materials and Chancellor of the Duchy of Lancaster, at the Treasury on January 22 to examine the contribution which the undeveloped mineral resources of Cornwall and Devon could make to relieve the existing and prospective shortages of non-ferrous metals. It was pointed out that an increase in the output of non-ferrous metals would allow the country to cut down imports of Malayan tin, leaving more of that commodity to go direct to the United States.

As a result of the conference it is expected that a statement will be made in the House of Commons.

ON JANUARY 18, K. & L. Steelfounders & Engineers, Limited, held their annual staff dance and supper at the Icknield Halls, Letchworth. The function was attended by over 200.

Israel's Metal-working Industries

Israel is anxious to develop her iron and steel, metal, and metal-working industries. Among the requirements listed are furnaces to produce pig-iron from native or imported ores, steelfoundries and grey-iron foundries, plant to process copper and aluminium, and a lead rolling and extrusion mill. Also required are factories producing tools and dies for machine tools, drop-forge plants, plant for fabricating structural steel, and assembly works for tractors and agricultural machinery. Altogether, it is considered that the metal industry needs to invest about $30,000,000 in new enterprises. Employment in the metal industry could be stepped up to 25,000 workers.

Output of the existing foundries in 1951 is estimated at 8,000 tons. The manufacture of industrial machinery and implements, though suffering from the lack of modern equipment, nevertheless reached an output of over £3,000,000 (I) in 1950. The two wire-drawing plants produced 6,000 tons, supplying the raw material for the local nail and wire-netting factories. In the non-ferrous metal industry, Israel has so far no producers of raw materials. There are, however, producers of semi-manufactures such as copper and copper alloys, sheets, strips, tubes, rods, etc. The one extrusion plant in Israel produces copper bars and pipes, and aluminium window frames.

Workington Iron-ore Difficulties

Costly emergency measures have had to be adopted by the Workington Iron & Steel Company branch of the United Steel Companies, Limited, in order to maintain output because, last week-end, there were only 5,000 tons of iron-ore—one week's supply—in the ore-stocking grounds at Moss Bay Works.

Recent storms delayed ships bringing iron-ore from North Africa, causing them to miss last week's high tides on which they could have entered the Prince of Wales dock at Workington. To keep the works in operation, the ships were diverted to Barrow, Glasgow, and Ardrossan, and the ore was brought by rail to the works.

Darlington Firm's Bridge Contract

Subject to certain conditions, the tender of the Cleveland Bridge & Engineering Company, Limited, Darlington, amounting to £A484,880 (about £387,900 sterling) for a new bridge across the Georges River at Sydney, New South Wales, has been accepted. The company is already building a smaller bridge at Sydney and when this is completed the staff will be transferred to the new structure, which it is estimated will embody about 1,000 tons of steel.

The bridge will be 912 ft. long and will carry a carriageway 44 ft. in width and two 6-ft. footpaths.

Italian Steel Output

In the first 11 months of 1951, Italy produced 2,776,695 tons of crude steel and 2,197,522 tons of finished steel, against 2,152,644 tons and 1,742,029 tons, respectively, in the corresponding period of 1950. In the same 11-month period 873,496 tons of pig-iron were produced, compared with 473,588 in the first 11 months of the previous year. Taking 1938 as a base year, these figures represent an increase of 31.2 per cent. for crude steel, 43.7 per cent. for finished steel, and 7.7 per cent. for pig-iron.

Italian aluminium production in the period January-November, 1951, totalled 37,800 tons, while that of zinc amounted to 34,000 tons.

Obituary

MR. WALTER OWEN BRIGGS, a director of Briggs Motor Bodies, Limited, Dagenham (Essex), has died in Miami. He was 74.

FORMERLY chief electrical engineer of British Engine Boilers & Electrical Insurance Company, Limited, MR. W. DAWSON HOPKINS died on January 19.

A DIRECTOR of Henry Hope & Sons, Limited, metal window manufacturers, of Smethwick (Staffs), MR. THOMAS HOLLINGWORTH RINGROSE died recently. He was 68.

THE DEATH occurred on January 17 of MR. CHARLES FRANCIS SIMPSON, formerly manager of the testing department of the English Steel Corporation, Limited, Sheffield.

MR. G. P. LEISHMAN, retired works manager of Alley & MacLellan, Limited, manufacturers of compressors and vacuum pumps, Glasgow, has died after nearly 50 years with the firm.

MR. THOMAS ARMSTRONG MCINTYRE, late a director of Shanks & Company, Limited, sanitary engineers and ironfounders, of Barrhead, near Glasgow, died on January 20. He was 79.

MR. A. P. S. MACQUISTEN, who was for many years a director and secretary of Stewart (Duncan) & Company, Limited, hydraulic and steelworks engineers, etc., of Glasgow, died on January 22 at the age of 82.

MR. ROBERT GREIG THOMSON, who has died at the age of 82, was chairman of Clayton, Son & Company, Limited, gas engineers, etc., of Hunslet, Leeds, and a director of Deighton's Patent Flue & Tube Company, Limited, and Goodall, Clayton & Company, Limited, colliery engineers, etc. He had been chairman of Clayton, Son & Company since 1945.

APPOINTED CHAIRMAN of Sir W. G. Armstrong, Whitworth & Company, Limited, in June, 1929, when the company was going through a difficult period as a result of the slump, and had to be reorganized, Maj.-Gen. GUY PAYAN DAWNAY, died on January 19. He was 73. He continued as chairman of Armstrong, Whitworth until July, 1935. Maj.-Gen. Dawnay was chairman of Dawnay Day & Company, Limited, merchant bankers, which has been responsible for introducing many businesses to the public, and of several other well-known companies. He was vice-chairman of the Financial Times, Limited, and of the Financial News, Limited.

Recent Wills

CORBETT, E. J., financial director of the Standard Motor Company, Limited £11,664

GRAYSON, SIR HENRY MULLENEUX, chairman of Grayson, Rollo & Clover Docks, Limited £312,632

SCOTT, DR. ALEXANDER, a former director of the British Ceramic Research Association £2,138

SPIKINS, F. R. G., a director of the Laystall Engineering Company, Limited, of London, S.E.1 ... ... £158,907

ROBERTS, G. E., first joint managing director of Coventry Malleable & Aluminium, Limited ... £29,357

WILLIAMS, GEORGE, chairman of the National Industrial Development Council of Wales and Monmouthshire £72,434

BANTING, P. E., at one time manager of the Manchester district office of the British Thomson-Houston Company, Limited £24,365

ROBB, HENRY, who founded Henry Robb, Limited, the Leith shipbuilders, which in the recent war built 42 ships for the Royal Navy £83,874

BONE, V. W., late chairman and managing director of Ruston & Hornsby, Limited, and formerly managing director of Ruston-Bucyrus, Limited... £56,881

Regulating the Labour Force

The National Joint Advisory Council, meeting in London last week, agreed to support the measures proposed by the Minister of Labour, Sir Walter Monckton, to regulate the supply of labour required in the defence, export, and basic industries. The British Employers' Confederation, the Trades Union Congress, and the nationalized industries are represented on the council. It is understood that the Minister's proposals include "some form of notification of vacancies order." Details of the measures are expected to be announced by Sir Walter shortly.

It was also agreed by the Council that certain industries should be asked to review their training schemes with a view to increasing efficiency and making the best use of labour.

M.P.'s Suggestions for Steel

If steel were denationalized the Iron and Steel Board should be reformed with wider powers than it had prior to nationalization, Mr. Aubrey Jones, Conservative M.P. for Hall Green, Birmingham, told a meeting of the City of London Conservatives on January 22. Mr. Jones, who is a director of the British Iron and Steel Federation, said that in addition to the negative powers the board had in the past, it should have compulsory power to undertake certain building and investment if it felt that the industry was not playing its part.

Though this policy recalled a form of competitive public enterprise such as was advanced by the Labour Party, it was the only way of securing stability in the status of the industry.

Steel Supply and Usage

The table below shows that although steel production last year was below the 1950 level, a larger tonnage was delivered to home consumers, due to larger withdrawals from stock, smaller exports, and a rather greater usage of second-hand material. The figures are in millions of ingot tons (2,240 lb.).

—	1950.	1951.
	Mill. tons.	Mill. tons.
Production	16.29	15.64
Producers' stock reduction	0.10	0.50
Imports	0.56	0.55
Secondhand and re-usable material	0.48	0.50
Total deliveries	17.43	17.19
Exports	3.25	2.65
Home deliveries	14.18	14.54

Appleby-Frodingham's New Blast Furnaces

Work began last Monday on the 30-acre site on which two new blast furnaces and ancillary plant are to be constructed at Scunthorpe (Lincs) for the Appleby-Frodingham Steel Company branch of the United Steel Companies, Limited. The project, which is expected to take three years to complete, will cost about £10,000,000.

The new blast furnaces, each 27 ft. in dia., are designed to produce some 500,000 tons of iron a year. Most of the ore used will be mined in North Lincolnshire.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained.

BARKING, February 18—Manhole cover and frames, and gully grates and frames, for the Borough Council. The Borough Engineer and Surveyor, Town Hall, Barking.

CANTERBURY, February 16—Castings, for the City Council. Mr. J. E. Rhodes, city engineer and surveyor, Municipal Buildings, Dane John, Canterbury.

DEAL, February 2—Manhole covers and frames, for the Borough Council. Mr. A. W. Pearce, borough engineer and surveyor, Municipal Offices, Queen Street, Deal.

GLASGOW, February 5—Spun-iron pipes and cast-iron special castings, steel files, steel tubes, tubulars and fittings, wrought-iron and steel bars, plates, etc., meter brackets, gun-metal castings, cast-iron, bolts and nuts, etc., for the Scottish Gas Board. The Divisional Controller, Scottish Gas Board, Glasgow Division (Glasgow District), 30, John Street, Glasgow.

HASLINGDEN, February 16—Iron castings, etc., for the Borough Council. The Borough Surveyor, Municipal Offices, Haslingden.

HEREFORD, February 11—Iron castings, for the City Council. Mr. F. Margerison, city surveyor, Town Hall, Hereford.

HEYWOOD, February 13—Cast iron, for the Borough Council. Mr. A. Middleton, borough engineer and surveyor, Municipal Buildings, Heywood.

HUDDERSFIELD, February 13—Cast-iron materials, etc., for the Borough Council. The Borough Engineer and Surveyor, High Street Buildings, Huddersfield.

JARROW, February 25—Cast-iron goods, for the Borough Council. The Borough Engineer and Surveyor, Town Hall, Jarrow.

JOHANNESBURG, February 21—Phosphor bronze bar, for the South African Railways. Room 6148 (CRE/707/52).

LEEDS, February 7—Road plates and studs, for the City Council. The Highways Engineer, 155, Kirkstall Road, Leeds, 4.

LISBURN, February 4—Manhole covers, etc., for the Urban District Council. The Surveyor's Office, Town Hall, Lisburn.

MANCHESTER, February 2—26,000 yds. of 6-in., 4-in., and 3-in. nominal dia. socket and spigot spun-iron water pipes, for the Corporation Waterworks. The Secretary, Waterworks Offices, Town Hall, Manchester, 2.

MIDDLESBROUGH, February 25—Spun-iron concrete-lined pipes, cast-iron concrete-lined pipes, cast-iron specials, surface boxes, and sluice valves and hydrants, etc., for the Tees Valley Water Board. Mr. E. A. Morris, clerk of the board, Water Board Offices, Corporation Road, Middlesbrough.

MIDLOTHIAN, February 23—All-steel frames and gratings, etc., for the County Council. The County Road Surveyor, 32, Palmerston Place, Edinburgh.

OLDBURY, February 16—Castings, for the Borough Council. The Borough Engineer and Surveyor, Municipal Bank Chambers, Oldbury.

PAKISTAN, February 26—11,456 tons of steel rails, 90 lb. "R" flatfooted, 42 ft. long, etc., for the Ministry of Communications. The Commercial Secretary, Supply and Stores Department, Office of the High Commissioner for Pakistan, 40, Lowndes Square, London, S.W.1. (Fee, £5).

POOLE, February 19—Castings, manhole covers, etc., for the Borough Council. Mr. J. R. Barron, borough engineer and surveyor, Municipal Buildings, Poole.

SLAITHWAITE, February 13—Cast-iron grates, gullies, and manhole covers, for the Colne Valley Urban District Council. The Council's Surveyor, Municipal Offices, Carr Lane, Slaithwaite, Huddersfield.

SLOUGH, February 18—Cast-iron manhole covers and frames, and gully grates and frames, for the Borough Council. Mr. E. G. Thorp, borough engineer and surveyor, Town Hall, Slough.

STAFFORD, February 7—Castings and road ironwork, etc., for the County Council. Mr. R. S. Murt, county surveyor, County Buildings, Stafford.

SWANSEA, February 9—Manhole cover, frames, etc., for the Borough Council. The Borough Engineer and Surveyor, Guildhall, Swansea.

WARRINGTON—250 ft. of 36 in. dia. spun-iron pipes, class B, and various specials, for the Rural District Council. The Engineer and Surveyor, Council Offices, Museum Street, Warrington.

WIDNES, February 4—Castings, for the Borough Council. Mr. J. Holt, borough engineer and surveyor, Town Hall, Widnes.

ALNWICK, February 16—Supplying and laying water mains, for the Rural District Council. Mr. O. M. Farrell, engineer and surveyor, 34, Green Bat, Alnwick. (Deposit, £3 3s).

KILKEEL—Supply and laying of sewer pipes, including 112 ft. 9 in. cast-iron pipes, for the Rural District Council. The Boardroom, Kilkeel (Co. Down).

MALTON, February 16—Provision and laying of about 1,680 yds. of 8 in., 6 in., and 4 in. spun-iron water mains, valves, etc., for the Urban District Council. Fairbank & Son, consulting engineers, Barclay Bank Chambers, St. Helen's Square, York. (Deposit, £2 2s).

Increases of Capital

The following companies are among those which have recently announced details of capital increases:—

FISHER FOUNDRIES, LIMITED, Birmingham, increased by £47,000, in £1 ordinary shares, beyond the registered capital of £3,000.

DOUGLAS FRASER & SONS, LIMITED, engineers, of Arbroath, increased by £150,000, in £1 shares, beyond the registered capital of £150,000.

GRAHAMSTON IRON COMPANY, LIMITED, Falkirk, increased by £180,000, in £10 ordinary shares, beyond the registered capital of £70,000.

MACREADY'S METAL COMPANY, LIMITED, London, N.1, increased by £100,000, in £1 ordinary shares, beyond the registered capital of £10,000.

NELCO, LIMITED, engineers, founders, etc., of Shalford (Surrey), increased by £30,000 in £1 ordinary shares, beyond the registered capital of £70,000.

C. & B. SMITH, LIMITED, ironfounders, of Wolverhampton, increased by £160,000, in £1 unclassified shares, beyond the registered capital of £40,000.

GABRIEL & COMPANY, LIMITED, general brassfounders, of Birmingham, increased by £12,500, in £1 unclassified shares, beyond the registered capital of £12,500.

ABELSON & COMPANY (ENGINEERS), LIMITED, Birmingham, increased by £25,000, in £1 "B" ordinary shares, beyond the registered capital of £75,000.

WILLIAM McPHAIL & SONS, LIMITED, founders, etc., of Glasgow, increased by £10,000, in £1 preferred ordinary shares, beyond the registered capital of £12,000.

LONDON & SCANDINAVIAN METALLURGICAL COMPANY, LIMITED, London, S.W., increased by £50,000, in £1 ordinary shares, beyond the registered capital of £10,000.

MONKHOUSE & BROWN, LIMITED, iron and steel merchants and stockholders, etc., of Newcastle-upon-Tyne, increased by £20,000, in £1 ordinary shares, beyond the registered capital of £30,000.

HENRY SIMONS (HOLDINGS), LIMITED, Cheadle Heath, Stockport (Ches), increased by £500,000, in 225,000 ordinary and 275,000 unclassified shares of £1 each, beyond the registered capital of £750,000.

J. STONE & COMPANY (DEPTFORD), LIMITED, mechanical, electrical, and general engineers, etc., of London, S.E.14, increased by £880,000, in £1 shares, beyond the registered capital of £1,400,000.

J. STONE & COMPANY (CHARLTON), LIMITED, mechanical, electrical, and general engineers, etc., of London, S.E.7, increased by £522,000, in £1 ordinary shares, beyond the registered capital of £600,000.

BETTLES & SONS, LIMITED, engineers, etc., of Wolverhampton, increased by £25,000, in 9,000 redeemable cumulative participating preference and 16,000 ordinary shares of £1 each, beyond the registered capital of £5,000.

STRACHAN & HENSHAW, LIMITED, engineers, etc., of Bristol, increased by £50,000, in £5 shares, beyond the registered capital of £210,000. At November 7, 1950, E. S. & A. Robinson, Limited, held practically all the issued shares.

ROBERT BOBY, LIMITED, engineers, etc., of Bury St. Edmunds, increased by £425,999 19s., in 1s. ordinary shares, beyond the registered capital of £74,000 1s. At November 27, 1951, Vickers, Limited, held practically all the issued shares.

SMART & BROWN (ENGINEERS), LIMITED, Spennymoor (Co. Durham), increased by £47,142, in £1 ordinary shares, beyond the registered capital of £130,000. The capital is now £177,142 in 55,000 redeemable first preference shares of £1 each, 70,000 second non-redeemable preference shares of 1s. each, and 118,642 ordinary shares of £1 each.

CRITTALL & WINTERTON, LIMITED, gas and sanitary engineers, etc., of Braintree (Essex), increased by £17,000, in £1 ordinary shares, beyond the registered capital of £13,000. The 50 founders' shares of £1 each have been cancelled and the reduced capital has been increased by the addition of 250 £1 ordinary shares. The original £5 ordinary shares have been converted into £1 ordinary shares.

ADDRESSING the Coventry branch of the Engineering Industries Association on January 21, Mr. Arthur Keats, managing director of Fisher & Ludlow, Limited, and chairman of the Midland Group of the Association, told members that the arrival in this country of steel from America may cause a substantial increase in the price of that metal. Any rise in steel prices, said Mr. Keats, would add to the difficulties of competing in overseas markets. At the same meeting, Mr. S. A. Davis, regional controller of the Ministry of Supply, said that in his opinion industry would be much happier at the end of this year than it is now, adding that although the steel allocation scheme has caused considerable outcry, he believed all revision would be in an upward direction.

Silica *versus* Basic Refractories

Recent Developments

The relative merits of silica and basic products in the basic open-hearth furnace have provided a source of controversy for many years. A few years ago it appeared that the silica brick was losing ground, but the advent of Silcrete brought with it a new challenge.

The silica manufacturer, always aware of basic competition, has had to make continual technical improvements in order to keep his product to the front. These include the installation of washing plant which has reduced the alumina impurity to 0.2 per cent., thereby increasing the safe working temperature of the open-hearth roof by approximately 20 deg. C. The introduction of dry-grinding plant has done much to ensure a more uniform product; closer control of the drying process, using tunnel dryers heated by waste heat from cooling kilns, has done much to overcome the cracking of bricks during firing. Even so, the normal British silica brick of today does not offer a serious challenge to the basic brick. This situation was discussed by MR. T. R. LYNAM, F.R.I.C., F.G.S., of the Oughtibridge Silica Firebrick Company, Limited, when he gave a Paper to the Refractories Group of the Sheffield Metallurgical Association on January 15.

Refractories Economics

The introduction of the Silcrete brick with both its low alumina (below ½ per cent.) and low porosity (16 to 18 per cent.) has re-opened the whole question of refractories economics. Using the split-roof technique, Mr. Lynam stated that the superior behaviour of Silcrete has been shown by a 4 in. step between the two halves after a seven weeks life of 98 casts, the normal silica product being badly melted and worn whereas the Silcrete was hardly affected. Costing analyses have shown that, in spite of the greater expense of the latter, this is offset, not only by increased roof life but by increased steel output per roof. It is felt that Silcrete must inevitably be a serious competitor of the basic brick since many British open-hearth furnaces are not designed to work at the very much higher temperatures and throughput necessary to make the basic roof an economic proposition.

Turning to basic refractories, one inevitably thinks of the 70 per cent. chrome - 30 per cent. magnesite brick as the usual standard product. Unfortunately, the constitution and availability of chromite make the quality of such bricks rather variable. At present, only first-quality Turkish chromite is regarded as satisfactory for roof-quality bricks. With the world economic position in a somewhat hazardous condition, research into methods of making an all-British basic brick is therefore of paramount importance. The present trend appears to be away from chrome-magnesite with its inherent fault of iron-oxide bursting expansion and towards a non-spalling magnesite product. Extensive work on torsion and elasticity is being

(*Concluded at the foot of col.* 2)

carried out in an endeavour to solve this problem. In the meantime, magnesite is finding a very wide application in the form of Metalkase tubes, both in electric-arc furnace side-walls and open-hearth backwalls. A more recent application following a local success is their use in uptakes of basic open-hearth furnaces.

Venezuelan Iron-ore

A contract recently settled between the Venezuelan Government and the Orinoco Mining Company is of great economic importance to the region surrounding the mining area and is hailed as the beginning of a new era of economic prosperity. Whether this prosperity will be shared by the city of Ciudad Bolivar remains to be seen, as there is the possibility that the port, to be known as Puerto Ordaz, which the company will construct at the confluence of the Orinoco and Caroni rivers may eventually supplant Ciudad Bolivar as the most important city in the region, particularly if the mining companies construct hydro-electric power stations and industrial plants on the Caroni River.

The minefields are expected to give employment to at least 1,500 men for an indefinite period, and the development of navigation and cheap transport will stimulate prospecting for other mineral deposits.

The Orinoco Mining Company's project comprises the dredging of the Macareo channel and Orinoco River up to a point where the Caroni River flows into it. At this point will be built the port of Puerto Ordaz and vessels of deep draught will be able to sail up to the port. A standard gauge railway 95 miles long will be built from Puerto Ordaz to Cerro Bolivar. It will have electric locomotives and large-capacity trucks. The iron will be extracted by electric mechanical shovels which will load it on to lorries; these will carry it to the railway. The ore will be crushed and stored in the port for loading by conveyor belt.

Developments envisaged include the use of natural gas in the reduction of iron ore, new oilfields, and the creation of hydro-electric power for aluminium smelting.

U.S.A. Steel Output Capacity

The annual steel capacity of the United States was rated at a record high level of 108,587,670 tons on January 1, 1952, an increase during 1951 of over 4,300,000 tons on the previous year, according to reports filed by steel companies with the American Iron and Steel Institute. In the course of five years the industry has raised its capacity by more than 17,300,000 tons, an increase that almost equals the annual capacity of Great Britain and is roughly half the reputed annual steel production in the U.S.S.R. This high rate of growth is unequalled in the history of steel.

The total annual steel capacity of the United States in 1940 was 81,600,000 tons and the level of 100,000,000 tons was reached in the early part of 1950. At the start of the Korean war in June, 1950, U.S. steel capacity was 100,500,000 tons and thereafter expansion proceeded at a rapid rate. The total increase of over 4,800,000 tons during 1950 raised the figure to 104,229,650 tons at the beginning of 1951.

Crucible Life.—Members of the Association of Bronze and Brass Founders who have had supplies of special crucibles for trial are requested to submit a report on them to the secretaries, Heathcote & Coleman, 25, Bennetts Hill, Birmingham, 2, for the consideration of the technical committee.

Imports and Exports of Iron and Steel in December

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in December. Figures for the same month in 1950 are given for the purposes of comparison and totals for the whole of 1951 and of 1950 are also included.

Total Exports of Iron and Steel (tons)

Destination.	Month ended December 31.		Twelve months ended December 31.	
	1950.	1951.	1950.	1951.
Channel Islands	580	444	8,553	8,659
Gibraltar	67	32	1,579	813
Malta and Gozo	263	97	4,116	2,933
Cyprus	388	660	8,508	5,119
Sierra Leone	479	347	4,685	5,396
Gold Coast	1,674	4,894	23,946	22,488
Nigeria	6,513	3,416	63,548	52,038
Union of South Africa	10,618	10,708	177,093	128,643
Northern Rhodesia	1,385	1,576	27,546	16,594
Southern Rhodesia	1,997	3,445	65,697	37,648
British East Africa	4,470	5,083	95,339	75,372
Mauritius	640	606	8,763	6,647
Bahrein, Kuwait, Qatar and Trucial Oman	397	550	7,136	7,804
India	7,392	8,707	98,958	90,096
Pakistan	7,477	5,450	105,610	73,444
Malaya	4,964	5,178	75,380	73,409
Ceylon	2,620	2,733	36,530	26,770
North Borneo	1,002	202	7,569	4,610
Hongkong	8,338	1,456	55,715	47,437
Australia	44,925	21,507	450,458	317,488
New Zealand	12,429	8,747	177,674	108,479
Canada	18,138	13,564	224,651	268,781
British West Indies	5,249	7,959	63,268	70,059
British Guiana	340	606	6,859	5,517
Anglo-Egyptian Sudan	491	835	16,493	9,876
Other Commonwealth	1,042	633	16,139	12,297
Irish Republic	8,277	4,491	100,027	80,730
Soviet Union	—	18	531	2,276
Finland	7,510	4,026	74,723	44,191
Sweden	7,632	8,470	90,597	115,622
Norway	5,122	5,392	83,818	61,246
Iceland	266	154	4,375	2,616
Denmark	6,800	5,230	107,655	78,681
Poland	87	23	1,625	771
Germany	36	101	949	1,172
Netherlands	5,408	5,769	76,999	83,420
Belgium	1,023	886	14,148	11,788
France	2,664	141	25,403	5,142
Switzerland	950	768	10,943	10,694
Portugal	606	628	18,827	12,167
Spain	186	224	6,767	4,522
Italy	1,421	777	12,950	31,055
Austria	98	27	1,064	425
Hungary	11	—	341	23
Yugoslavia	555	1,272	13,070	8,641
Greece	397	386	7,556	2,500
Turkey	751	704	9,412	6,351
Indonesia	898	968	11,440	10,386
Netherlands Antilles	788	2,118	8,519	10,275
Belgian Congo	93	140	2,008	2,043
Angola	78	788	2,139	2,610
Portuguese E. Africa	413	382	4,842	4,023
Canary Islands	215	977	2,229	2,826
Syria	59	46	1,741	4,567
Lebanon	707	2,777	12,209	17,325
Israel	3,146	814	27,497	29,805
Egypt	4,106	669	59,696	37,536
Morocco	1,150	59	5,791	1,450
Saudi Arabia	30	189	2,231	2,335
Iraq	2,777	223	36,234	23,546
Iran	7,346	16	99,828	58,656
Burma	720	1,278	11,961	14,238
Thailand	1,545	1,051	11,120	15,250
China	2,688	11	8,716	4,634
Philippine Islands	224	410	8,992	3,988
U.S.A.	19,399	4,598	73,529	135,971
Cuba	690	312	2,787	3,908
Colombia	712	265	6,713	8,423
Venezuela	1,800	5,456	30,854	43,406
Ecuador	192	379	3,882	2,621
Peru	1,256	792	12,139	11,799
Chile	2,813	369	17,699	8,711
Brazil	3,331	1,326	33,623	22,866
Uruguay	2,240	657	11,855	10,665
Argentina	3,580	8,884	63,579	47,880
Other foreign	2,085	1,198	20,958	18,140
TOTAL	258,759	186,074	3,088,404	2,602,333

* The figures for 1951 are not completely comparable with those for previous years.

Total Imports of Iron and Steel (tons)

From	Month ended December 31.		Twelve months ended December 31.	
	1950.	1951.	1950.	1951.
India	2	1	22,945	15
Canada	3,304	3,562	39,225	49,313
Other Commonwealth and Irish Republic	111	161	1,699	2,019
Sweden	1,398	2,014	14,010	21,890
Norway	3,728	4,100	52,110	50,509
Germany	3,454	8,707	70,758	44,964
Netherlands	2,277	10,756	44,579	80,666
Belgium	6,146	16,187	95,371	190,617
Luxemburg	2,545	5,690	41,945	81,836
France	30,229	31,865	302,328	274,992
Austria	51	43	3,429	19,126
U.S.A.	1,172	8,293	62,119	53,105
Other foreign	132	2,688	6,387	16,062
TOTAL	54,549	94,067	756,905	885,134
Iron and steel scrap and waste, fit only for the recovery of metal	82,293	34,104	1,958,310	597,722

Exports of Iron and Steel by Products (tons)

Product.	Month ended December 31.		Twelve months ended December 31.	
	1950.	1951.	1950.	1951.
Pig-iron	3,348	362	35,419	15,967
Ferro-alloys, etc.—				
Ferro-tungsten	88	7	1,171	394
Spiegeleisen, ferro-manganese	190	25	2,530	1,437
All other descriptions	119	51	1,546	1,028
Ingots, blooms, billets, and slabs	865	13	6,730	5,264
Iron bars and rods	1,018	404	5,543	8,285
Sheet and tinplate bars, wire rods	1,728	15	21,298	11,301
Bright steel bars	5,085	1,180	47,680	28,934
Alloy steel bars and rods	1,433	1,280	14,935	16,317
Other steel bars and rods	25,772	8,822	270,743	165,299
Angles, shapes, and sections	18,283	9,900	166,628	152,455
Castings and forgings	482	1,062	7,919	12,800
Girders, beams, joists, and pillars (rolled)*	4,100	1,563	60,996	36,408
Hoop and strip	11,726	2,867	122,647	72,694
Iron plate	156	135	2,563	1,887
Tinplate	20,523	26,007	247,881	239,663
Tinned sheets	225	115	2,822	2,291
Terneplates, decorated tinplates	73	73	893	1,551
Other steel plate (min ¼ in. thick)	25,292	15,709	328,665	263,236
Galvanized sheets	8,168	3,594	113,151	53,878
Black sheets	11,523	8,484	139,018	144,441
Other coated plate	588	450	11,727	7,910
Cast-iron pipes up to 6 in. dia.	5,417	6,311	76,653	84,552
Do., over 6 in. dia.	4,246	4,189	78,994	70,265
Wrought-iron tubes	32,089	32,050	354,085	387,478
Railway material	22,469	15,760	309,766	210,399
Wire	6,931	4,345	86,851	58,787
Cable and rope	4,116	2,066	34,643	28,844
Wire nails, etc.	3,208	1,779	26,723	25,696
Other nails, tacks, etc.	1,087	654	7,447	9,792
Rivets and washers	558	664	8,254	7,615
Wood screws	300	436	4,054	4,285
Bolts, nuts, and metal screws	2,076	1,984	30,674	28,271
Baths	903	869	13,713	14,336
Anchors, etc.	570	641	8,876	9,147
Chains, etc.	766	714	10,300	11,163
Springs	529	487	8,288	6,650
Holloware	5,351	3,199	85,141	36,013
TOTAL, including other manufactures not listed above	258,759	186,074	3,088,404	2,602,333

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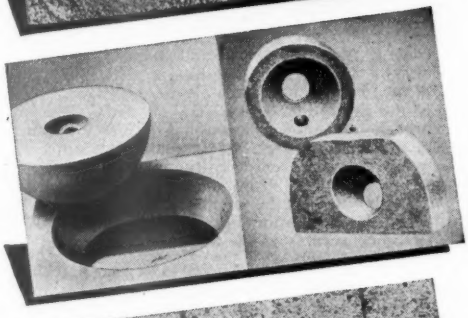

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DURAX No 2 **REFRACTORY CONCRETE**

For casting in situ and making special shapes. Supplied dry. Special characteristics include—rapid setting as hard as firebrick: pours into position: no permanent volume change: little tendency to spall. Maximum service temperature 1300°C.

DURAX No 3 **REFRACTORY CEMENT**

A finely ground air setting cement for jointing all types of firebricks. Supplied dry. Special characteristics include:—produces thin and strong joints: negligible shrinkage: highly refractory: economical in use. Maximum service temperature 1650°C.

★ *Fully descriptive literature on all of these grades of Durax is available on request.*

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News in Brief

THE UNITED STEEL COMPANIES, LIMITED, announce that Mr. E. E. Ingleton has been appointed works manager of Yorkshire Engine Company, Limited, Sheffield.

STIRLING TOWN COUNCIL have decided to grant £100 towards the War Commemoration Committee's proposed fund to provide a carillon of bells to the memory of the town's dead of the last war.

IT HAS BEEN DECIDED to continue the extended hours of opening of the Patent Office Library at 25, Southampton Buildings, Chancery Lane, W.C.2. The hours are 10 a.m. to 9 p.m. Monday to Friday and 10 a.m. to 5 p.m. Saturday.

THE NORTHERN ALUMINIUM COMPANY has announced that Saturday-morning work at its Banbury factory will end as from February 9, owing to the shortage of aluminium. Hitherto the 2,500 workers at the factory had operated a Saturday shift from 6 a.m. to 1 p.m. in a three-weekly rota.

AT DECEMBER 11, 1951, the official index figure, which measures changes in the average level of retail prices, compared with the level at the base date (June 17, 1947: 100), was 130 compared with 129 at November 13, 1951. The increase in the price of coal contributed to the rise.

PHYSICISTS AND ENGINEERS who wish to obtain specialized knowledge of electronic instruments used in nuclear physics and radiochemistry are being offered a week's course at the Atomic Energy Research Establishment, Harwell. This is the third time that a course in electronics has been arranged there for specialists from industry and outside organizations.

FOLLSAIN-WYCLIFFE FOUNDRIES, LIMITED, and Varatio-Strateline Gears, Limited, announce the appointment of the following new technical sales representatives:—Mr. F. M. and Mr. G. Lister, of Bromley—Sussex and Kent; Mr. E. C. Gumbrel, of Newcastle-under-Lyme—North Wales, Shropshire and the Potteries; Mr. P. G. Hibberd, of Axbridge—the West Country.

"WELCOME TO THE 4TH GENERATION" in electric lights, was the greeting which confronted Mr. Ian Ley, when he attended the clock-and-certificate dinner of Ley's Malleable Castings Company, Limited, and Ewart Chainbelt Company, Limited, Derby. Mr. Ian Ley was making his first attendance at a presentation dinner, and employees in the electrical department constructed the sign for which 300 light bulbs were used.

ALDERMAN A. H. HANCOX, mayor of Rowley Regis, has urged the co-operation of local manufacturers and all householders in an iron and steel scrap drive which began on Monday, January 28. As the area is heavily industrialized, it is expected that the target of 100 tons will easily be passed. The Rowley Regis Council is giving a lead by seeking the co-operation of all the local government departments, whose depots are expected to yield a sizeable quantity of scrap metal.

FOURTEEN FIRMS located in Northern Ireland, manufacturing a wide range of products, will have a joint stand at the heavy industries section of the British Industries Fair at Castle Bromwich, Birmingham. A statement issued in Belfast last week by the Northern Ireland Ministry of Commerce said that it was hoped that the joint exhibit, besides promoting increased business for the firms taking part, would draw attention to the industrial possibilities of Northern Ireland.

A DECREE has been published in Argentina declaring the manufacture of motor vehicles, agricultural machinery, their spare parts and tools to be of national interest. The import of materials used in their manufacture will be subject to prior permits and import quotas. Raw materials, equipment, and instruments may be imported duty free, provided that in the opinion of the Ministry of Industry and Commerce they cannot be made in Argentina in accordance with accepted standards of time, quantity, quality, and price.

A DISAGREEMENT has arisen between Halifax engineers and the Employers Federation over holiday arrangements, the men claiming the September break in addition to the fortnight's paid holiday and six Bank holidays, and also wanting their two weeks holidays to be consecutive. On the other hand, the employers want the men to take their two weeks separately—one in June and the other in September, the second week to include the present September break. They also claim that although the break is unpaid the men are exceeding the agreement of last November for 16 days paid holiday a year.

AN INTERESTING CEREMONY took place at Widnes Foundry & Engineering Company, Limited, recently, when, amidst a gathering of long-service men (nine with an average service of 54 years), a cheque was presented to Mr. I. Sankey upon the 60th anniversary of his starting at the foundry by the joint managing director, Mr. R. Credland. After the presentation "Ike" (who is still doing a good job of work at the foundry) suitably acknowledged and recalled various events of his early life. Altogether the ceremony formed a very enjoyable interlude in a function attended by long-service personnel of whom this company is justifiably very proud.

IF LAST YEAR'S pioneer venture is anything to judge by, foundrymen in the Midlands will find much to interest them in the Industrial Safety Exhibition which the Birmingham and District Industrial Safety Group is organizing at Bingley Hall, Birmingham, from May 4 to 16, 1953. The fact that plans are already in hand for a show 15 months ahead is some indication of the scope of the exhibition, which aims not only to include a comprehensive survey of established safety practice, but also to cull from local firms—many of them foundries—recent devices empirically proved worthy of introduction. Exhibits from many foundry trades in the Midlands are to be included. The decision to organize a 1953 exhibition has been taken in view of the outstanding success of the initial exhibition in 1951.

THE ANNOUNCEMENT that Aberdeen is to get a share of the rearmament work is good news for engineers, who had feared that the shortage of steel was to mean considerable unemployment in the area. Part of the factory of Tullos, Limited, makers of agricultural machinery, will, it is understood, be taken over by the Consolidated Pneumatic Tool Company, Limited, Fraserburgh, who have received the rearmament contract, but cannot cope with it at their Fraserburgh premises because of lack of space. A member of the Consolidated Pneumatic Tool Company said a considerable quantity of new machinery would have to be installed at the factory of Tullos, Limited, and, while it was hoped that an early start would be made, a period of about 18 months would elapse before they reached maximum output and employment. A certain number of key men would be transferred from Fraserburgh, but the remainder would be recruited in Aberdeen. The management of Tullos, Limited, announce that there is every intention of continuing the production of the lines of agricultural machinery in which they specialize.

BULLOWS

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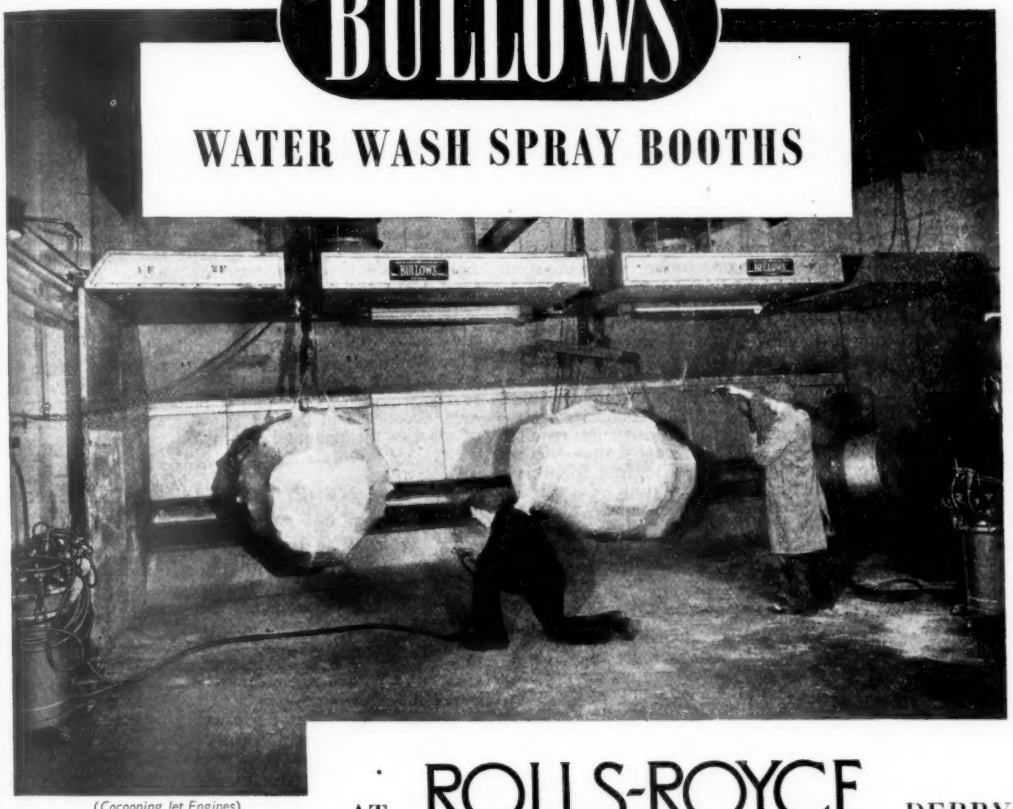

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Raw Material Markets

Iron and Steel

Sufficient supplies of raw materials, including ore and coke, are now available to enable many of the furnaces in blast to implement their allocations to the foundries. Producers are distributing available tonnages as evenly as possible and endeavour to forward supplies where they are most needed. What the foundries receive is governed by outputs and not by the amounts licensed by the Control, most users being unable to acquire their full licensed tonnages in any of the foundry grades of pig-iron or hematite. Even with the recent slight improvement in outputs, most furnaces still have to allocate supplies based on a percentage of the quantity supplied in 1950.

Apart from home demands for castings for essential new plant and repair work, many foundries are engaged on a heavy programme of work for the export market, particularly the general engineering, speciality, and textile foundries, while a good proportion of castings from the light and jobbing foundries are for shipment. The building trades are already taking fairly good quantities of castings from the light foundries, and if the Government's building programme is to be implemented, larger supplies will be required. If the foundries are to fulfil these commitments, they will certainly require increased supplies of pig-iron. A recent feature of the trade in the north-east is that a few jobbing foundries are now seeking additional orders.

Improvement in deliveries of foundry coke is urgently needed. The position now is that supplies are barely sufficient to cover current requirements, thus affording no opportunity for users to replenish their depleted stocks. No difficulty is experienced in acquiring limestone, ganister, and firebricks.

There is no improvement in the supply of steel semis to the re-rollers, and prospects of increased supplies are very remote. With reduced outputs of steel at home, the producers are unable to improve on present deliveries, and supplies from the Continent, while showing a slight expansion, are considerably below requirements. There is heavy pressure for all their products, but the re-rolling mills are unable to enlarge their outputs of sections, bars, and strip, and orders for sheets are heavily in arrears. Short-time working is fairly general.

Non-ferrous Metals

The London tin market was not slow in responding to bullish influences. At the close last week the cash position was able to show a gain of nearly £40, with three months up by a similar amount. Both positions stood at over £1,000 last Friday afternoon and there is a likelihood of a firm tone for some time to come since nobody will be keen on taking up a bear position with the British Government's buying order for 20,000 tons in the offing.

But apart from this, bull operators were encouraged by the news that the Reconstruction Finance Corporation had raised its selling price by no less than 18½ cents to 121½ cents per lb. This is 3½ cents over the price agreed between the two Governments for the 20,000 tons deal, the additional charge being, it is reported, to cover the cost of transportation from f.o.b. shipping port to destination in the United States.

The next matter for settlement is the Bolivian contract and no doubt we shall soon have news of talks being opened between the two parties. The general opinion seems to be that something will be fixed up, and $1.25 has been suggested as a possible basis. Yet another encouraging factor in the tin market is the possibility that America may decide to buy some Malayan tin outside the 20,000 tons contract. Today this would hardly be available below 125 cents and a purchase at that price would, it is understood, have some repercussions on the figure of 118 cents stipulated in the purchase arrangement with the United Kingdom.

London Metal Exchange official tin quotations were as follow:—

Cash—Thursday, £989 10s. to £990; Friday, £1,000 to £1,005; Monday, £1000 to £1,005; Tuesday, £1,000 to £1,002 10s.; Wednesday, £995 to £997 10s.

Three Months—Thursday, £986 to £987 10s.; Friday, £1,000 to £1,002 10s.; Monday, £997 10s. to £1,000; Tuesday, £998 to £999; Wednesday, £992 10s. to £994.

Against the background of the recent "loan" deal in aluminium with the United States, it is not surprising that some alarm was felt in metal circles last week when it was reported that Canada was selling an additional 15,000 tons of copper this year to America. A total figure of exports from the Dominion to the U.S.A. of 75,000 tons was mentioned, this being very nearly twice as much as Britain imported from Canada in 1951.

In 1950 we took something like 60,000 tons from Canada, which, as one of our chief suppliers before the war, used to send about 100,000 tons annually. The severe pruning of Canadian shipments of copper during 1951 accounted in no small measure for the condition of scarcity throughout last year.

Pricing Arrangements for Copper, Lead and Zinc

The Ministry of Materials announces that, in order to facilitate the pricing of export orders by manufacturers, the following supplementary method of pricing orders for copper, lead and zinc will come into effect today.

From January 31, orders may be placed on the Directorate of Non-Ferrous Metals, Rugby, by telegram and, provided telegrams are handed in to the Post Office not later than 2 p.m., the orders they contain will be priced at the price ruling on the day of despatch of the telegram. A licence will continue to be necessary before a sales contract can be completed and the amounts licensed will be limited to the quotas announced from time to time and notified to individual firms. All orders placed by telegram must be confirmed by letter with the necessary supporting documents and no steps will be taken to supply the metal until such written confirmation is received. Telegraphic orders handed in to the Post Office after 2 p.m. will be priced at the price ruling on the day following the date of handing in. Orders placed by letter will continue to be priced on the day following the day of posting.

Any enquiries arising out of this announcement should be made to the Directorate of Non-Ferrous Metals, 20, Albert Street, Rugby.

"BEATING THE NICKEL SHORTAGE" will be the subject of the spring conference of the Institute of Metal Finishing. The conference will be held at Eastbourne from April 23 to 26.

OF 3,613 TONS OF WOLFRAM exported from Portugal in the period January to November, 1951, compared with 2,813 tons in the first 11 months of 1950, Great Britain took 1,988 tons, against 2,155 tons in the same period of 1950. Shipments to the United States totalled 1,474 tons (nil). Other recipients were Sweden 73 tons, Germany 20 tons, Belgium 12 tons, Italy 11 tons, and other countries 35 tons.